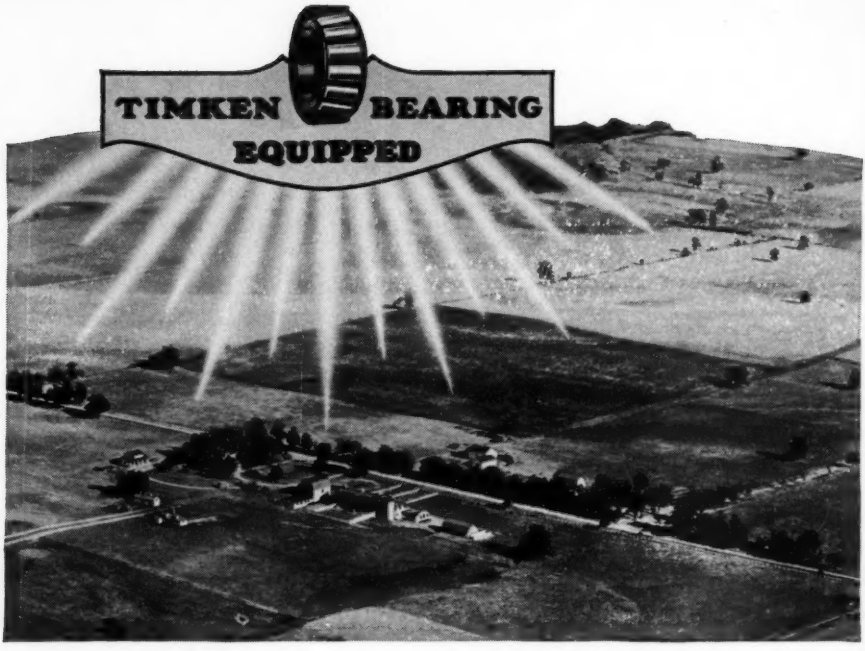
# Better Crops WITH PLANT FOOD

September, 1930

The Pocket Book of Agriculture




# The Axis of Farm Progress

Sun, rain, heat and cold come alike to all. No one can control them.

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**TIMKEN** *Tapered Roller* **BEARINGS**

# Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*

*Editorial Offices:* 19 West 44th Street, New York

VOLUME XV NUMBER THREE

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Agricultural and Scientific Bureau
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*This young man is very proud of his fine team. Good farm animals are always a valuable asset to any farm.*

Better Crops with PLANT FOOD

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**Frost is coming and days of —**

# Harvest

By Jeff McDermid

IN August of this year I visited my friend, The Master Farmer, who was harvesting the ninetieth successive annual crop of grain from one of the oldest farms in my home state. He was operating a modern binder with a power take-off from a tractor, instead of the cradle that his father used, and which he proudly showed me as a relic of priceless family value.

It was only a matter of a few hours for my friend to harvest the 30 acres of oats and barley, whereas when his father cut the crop of wheat from 50 acres laboriously plowed by oxen, he required four men to cut and eight men to bind after them in a period of five days' work. Thereupon followed a fever of stacking with slow moving ox-teams, and the coming of the tread-power thresher had to be awaited with patience. When the wheat was threshed, it had to be hauled to a distant cash market on the lake, because the railroads had not yet arrived to challenge the water routes.

In a crop of 1,000 bushels of wheat there were 25 wagon-loads. Each one of these precious items of the harvest had to be transported over rough, un-

broken, dusty, or muddy roads to a market that paid less than 70 cents a bushel. A load of 2,400 pounds, or 40 bushels of wheat, could be hauled by horse teams at 25 or 30 miles a day. Farmers living 100 miles or so from this only cash market camped out along the trail or stayed at taverns. My host's father was farsighted indeed, for his homestead was located a day's drive from the lake port market, so he could make the trip in two days going and coming. Yet with only 30 dollars in his jeans after the long trek to market, and with visions of more than 20 other weary journeys before winter set in on his season's liquidation, I truly wonder if my host's father or his neighbors faced any stiffer dilemma than the Federal Farm Board of 1930.

IN growing and marketing his wheat the pioneer farmer had no dizzy inventions, mechanical and mental, to help or hinder his slow moving progress. As we observed before, his 50 acres employed 12 men to harvest the crop of 1,000 bushels. They may have been slow movers, but they were fast eaters and bountiful providers of simple fare. He needed them to stack, and a whole crew of them were required for threshing. In those days a few acres *had* to support more human mouths and exacted from each human frame more tithe in the shape of muscular labor.

His road to market was not paved nor provided with motor truck facilities. No grain exchanges docked him or "hedged" him about with red tape. If anybody had told him to cut his acreage of wheat he would have been as wrathy as the Governor of Kansas, and he would possibly have said even more. He had no machinery to eat up his profits. He let the harvest hands do that, because providing food and shelter were the primary jobs of a pioneer community.

Our son of the Pioneer finds it harder to be a *financial* success in these days when it is easier to be a *mechanical* success. I reckon that about sums it up in most of the trades and crafts that look to farmers for their post toasties. The release of so much human energy from the elemental tasks like food production, enabling the surplus to enter the realms of essay writing, peddling, and motion pictures, bears as much relation to the present dilemma as the surplus bushels of wheat that Mr. Legge wants to sell. You see, all these extra harvest hands have to get a living somehow disposing of the trinkets and services that everybody (including the farmer) have come to desire more or less.

Our son of the Pioneer can do all the harvesting in two days that his father and 11 men sweated over for a week. But mechanics stepped in and sped the plow beyond the census rate. If we had started our "eat more" campaigns so as to even up the vast gulf between food production and population, maybe by this time the human stomach would have distended enough by natural inheritance so as to save the days for the hard pressed farmer. Our colored advertisements of cheese, milk, and fruit cannot increase intestinal capacity or satisfy the wants of the moneyless.

All these cold economic figures on consumption do not satisfy me about the matter. I know there are too many hungry folks among the surplus harvest hands who left the farms years ago to get into the city's simple life. Somebody had a corner on the surplus perhaps, but these starving people don't seem to get into the right corner where the cupboard stands. If we could get this agricultural movement all set to iron out that difficulty while we are cutting through the ticker tape that ties us, it might solve the problem a little faster than to look only at the production and storage side.

Sometimes I think secretly, for it is bad form to express it, that maybe we

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*Progressive farmers look for real farm relief in —*

# Rebuilt Soils

By C. A LeClair

St. Louis, Missouri

More grain drills, corn, potato and cotton planters with fertilizer attachments are being purchased by farmers in the present generation than ever before in the history of the country.

GONE forever are the days when the fertility of our agricultural lands can be considered inexhaustible. The time has come when the same genius that has been exhibited in the improvement of livestock must now be applied to the maintenance of the fertility of our soils on which in the final analysis all agricultural wealth depends. Marginal land farmers, and those who have failed to increase the productiveness of inherently good soils, are finding it increasingly more difficult to subsist.

No longer can farmers anywhere in America hope to continuously take wealth from their land without re-investing a part of their returns in a systematic program of soil fertility maintenance.

It would seem that in direct proportion to the extent that power is applied to farming does it become necessary to employ commercial fertilizers to enrich the soil. This fact is evident when it is remembered that with oxen it took centuries to exhaust the fertility of some of the Atlantic Coast State soils. With horses Ohio farms were in many sections depleted in less than a century. Then when tractors replaced the horse in the Dakotas, farms that were supposed to never wear out were made practically barren in less than a generation in some sections. Conversely, wherever a systematic attempt has been made to combat plant food wastage in this country, prosperity now reigns.

### *Efficiency Counts*

Farmers who consistently grow a bale of cotton, 40 bushels of wheat, or 100 bushels of corn to the acre are making money even when cotton brings as little as 16c a pound, wheat 80c or corn 50c a bushel. Fertile lands mean low production costs of quality crops and consequently tend

to insure a profit to the grower regardless of fluctuations in market prices. After all, the present low price of farm products is indicative that the better producers have developed methods of growing everything with less effort and expense. In other words, mass production methods have been put to work on the farm. For example, fewer hens and cows are now producing more eggs and milk than was the case five years ago. Likewise, fewer trees are producing more and better fruit in 1930 than was the case in 1920. Again, whereas formerly 25 per cent of our improved land produced nothing more than a poor crop of noxious weeds, we today have laws in many states making it compulsory for farmers to eliminate such waste.

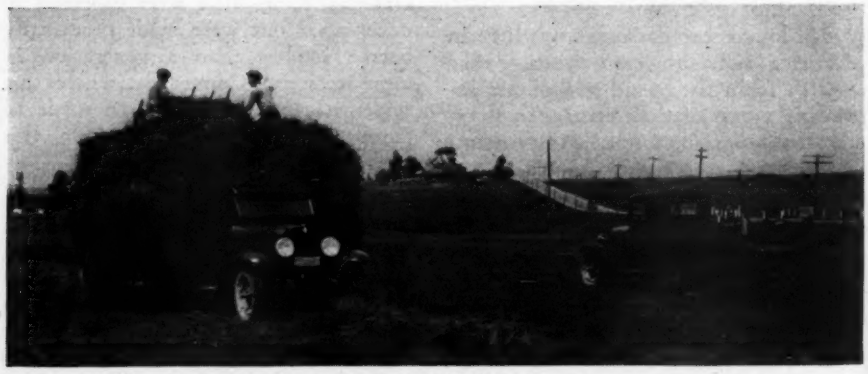
### *The Basis for Success*

All of this brings us face to face with the fact that it is not the number of acres farmed but the amount of per capita production that offers the basis for continued agricultural prosperity. To make two blades of grass grow where one grew before, therefore, is not only a commendable aim but the only one that any farmer can afford to follow.

Realizing that a fertile soil is the foundation of success in any type of farming, County Agricultural Agents are working overtime to give their clientele an understanding of the fundamentals of soil fertility maintenance. Their work is bringing about a more general appreciation of the fact that of the three major ways by which soils are depleted, namely, through leaching of plant food by rain, sale of fertility in products marketed, and erosion, the latter is most devastating. For instance, even in the comparatively young agricultural state of Oklahoma, C. P. Blackwell, director of the agricultural experiment station, emphatically points out the urgent need of soil conservation.

"This state's native soil fertility is largely gone. Our original supply of organic matter is exhausted. Our crop yields are on a steady decline," says Dr. Blackwell. Of some 16,000,000 acres of cultivated land in Oklahoma already 13,000,000 acres have been more or less impaired by erosion. To stop this loss farmers are being taught how to terrace and rotate their crops.

At the Missouri Agricultural College, under the direction of Professor M. F. Miller, an historic series of observations for many years has been in progress which has provided a measure of the effectiveness of different cropping systems in preventing erosion. The results of these studies reveal that it is much easier to prevent loss of plant food by "sheet wash" under a system of cropping which includes having the land in clover and grass one or more years in each round



**The use of commercial plant food in profitable farming becomes proportionately more necessary as power is applied to the cultivation and harvesting of crops.**

**Farmers everywhere are becoming intensely interested to learn more about the use of commercial plant foods for profit. Farm women cooperate to make the educational meetings called by County Agents successful.**

of the rotation, than by growing grain crops continuously.

The effect of growing legumes and grass as a means of maintaining the humus and tilth of land is having more significance as the evidence of Agricultural Experiment Station investigations accumulate. Tests recently made at the Rhode Island Experiment Station prove that even under a system of truck growing in a three-year rotation, it is possible to maintain a high level of production by the use of commercial fertilizers alone if every sixth crop grown is a clover crop to be turned under.

### *Prejudices are Removed*

Since it is far less costly to maintain the productiveness of good land than to be obliged to rebuild a worn-out farm the use of commercial plant foods is no longer looked upon as a last resort. American farmers have the world's best batting average of intelligence. Old prejudices are gone. Already about one farmer in ten is today making use of commercial fertilizers to increase his yields and profits. Agricultural extension experts have done much to disseminate the facts. Last year, for example, County Agents throughout the nation installed nearly 100,000 soil fertility demonstrations and over 200,000 farmers treated their soil on the recommendation of these experts.

In this connection, a statement made by one of these missionaries of farm relief typically reflects the first-hand experience of one who is having phenomenal success in preaching the gospel of more profitable farming in his county. He says, "This problem of getting farmers to do the things we think is best for them is not so easy. Still when I look back a few years I can see a great change. I am gratified for the fact that I had used commercial fertilizer before I became a County Agent and was completely sold on the value of it. Then, too, I worked for one year as a salesman for a manufacturer of fertilizer. This was good experience to equip me for my present work. Now I find farmers intensely interested in soil problems. They realize that they have handled their stock and other phases of their business in a more scientific manner than they have their land. Hence, they are now rapidly becoming more than eager to learn and practice better soil management."

In the Midwest, particularly, farmers have become vitally interested in the use of commercial fertilizers. That

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# *This* County

## *Two theories are discussed*

WHEN a county agent gives advice to his farmers, it is as if he gave them signed blank checks. The wise farmer makes his worth a large figure." This recent assertion by a writer attempting to make clear the functions of a county agent illustrates how firmly entrenched is the notion of the agent as a traveling teacher who advises, directs, leads, and frequently exhorts his farmer constituency to better ways. The county agent, the colleges take for granted, is a sort of college professor assigned to a county, "the local branch of the agricultural college." It is true he varies his technique from that of the class room, and that he localizes, simplifies and makes more practical and pointed his teachings, yet he remains essentially a school teacher, according to this view.

Dominant as is this concept in the mind of much of the public, it is interesting and important to note that this is exactly what the county agent is not, in the opinion of another school of thought. It is curious, too, to recall that the beginnings of county agent work in America were made entirely independent of the colleges and that its founder, Dr. Seaman A. Knapp, although an ex-college president, insisted that the intrusion of this academic view-point would destroy the power of the county agent as a re-vitalizing force in American agriculture. The adult rural public learns by seeing and doing, he claimed, and his unique method of bringing improvement by establishing local demonstrations of better ways of farming and home-making was essentially a protest against the didactic, schoolroom method of approach. Shortly after his death in 1911 farm demonstration work was nationalized and turned over to the state agricultural colleges for local direction.

The swallowing process he predicted is well nigh complete, and today the college campus, according to proud assertion, "covers the entire countryside." No one will question the desirability of the extension of educational facilities as far as possible, nor will anyone claim that the present initerant school teaching that constitutes so large a part of present day extension work is inherently bad. But there are many who have witnessed the virility and power of the simple farm or home demonstration in re-making country communities, who believe that the American mania for standardizing even education has resulted in the abandonment of a stronger for a weaker method in the field of rural improvement.

### *A Farm Relief Measure*

Few persons realize that agriculture and home-making extension work was a farm relief measure enacted by the Congress. It is true that the Smith-Lever Act nationalizing extension work was chiefly based upon 10 years of farm and home demonstrations in the South, but in its rapid expansion at the hands of officials of agricultural colleges it lost much of its homely rural "ground up" development and became a centralized, "top down" system. It became the voice of the col-

# AGENT Job

## By W. H. Darrow

Texas Extension Service Editor

**This demonstrator, J. H. Willis of Hill county, Texas, is going over his records with J. M. Martin, county agent. This 75-acre cotton field has increased in yield 10 bales in two years by following demonstration methods. Terracing to prevent sheet erosion and to conserve moisture was a big factor.**

lege to the farmer, instead of the self-help system of betterment the farmer was working out for himself with aid from the local extension agents. The modern trend in county and home demonstration work is toward long-time education of the rural masses, rather than quick, decisive, convincing reformations of the farm and home business.

The demonstration is simply the placing of a farm or home enterprise on a better paying basis through a period of months or a few years at most, and the keeping of records to show progress. This, the older school maintains, is the foundation of extension work. The other half of the county or home demonstration job, it is argued, is the extension of the results of these demonstrators to the neighborhood through meetings, tours, exhibits, and news stories.

In the academic type of extension work so common, a farmer asking information about the possibilities of Nortex oats, for instance, will be told by the county agent what the experiment station 100 or perhaps 500

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Second crop for 1930 on 120-acre field of R. T. Alexander.

# $100 *per* Acre *from ALFALFA*

By O. T. Coleman

University of Missouri

ONE hundred dollars per acre return from five cuttings of alfalfa on 120 acres of upland soil in Howard county, Missouri, was made possible through the proper use of high grade fertilizer and limestone.

In the spring of 1928, R. T. Alexander plowed 120 acres of upland soil near Armstrong in Howard county, Missouri, and applied three tons of good limestone per acre on it. During the summer he worked this ground often enough to keep the weeds killed and maintain a surface mulch. By doing this, he was able to conserve the moisture and mix the limestone well with the soil, thus allowing it to dissolve more readily and more of it become available by seeding time. In the fall of 1928, 200 pounds per acre of a 2-12-2 fertilizer were applied and the field was seeded to good northern grown alfalfa. Just previous to sowing, the seed was inoculated.

About the time that growth started in the spring of 1930, another application of 125 pounds per acre of an 0-21-9 fertilizer was made on all of the 120 acres except a small strip that represented an average part of the field. The two cuttings made since then yielded an average of about 500 pounds per acre more hay where the 0-21-9 fertilizer was applied than on the strip where it was omitted. This showed quite clearly the necessity of feeding alfalfa to keep the yields up.

Last year Mr. Alexander cut three crops of hay from this 120 acres and this year he has taken off two crops. Each of these five cuttings have averaged fully one ton per acre and he has received an average of approximately $20.00 per ton, or a total return of $100.00 per acre from the land the past two years and, if the weather is seasonable, he will probably receive another ton at the third cutting this fall.

Figuring the delivered price of the limestone at $1.75 per ton, the cost of hauling and spreading at $1.00 per ton, the 2-12-2 fertilizer at $33.30

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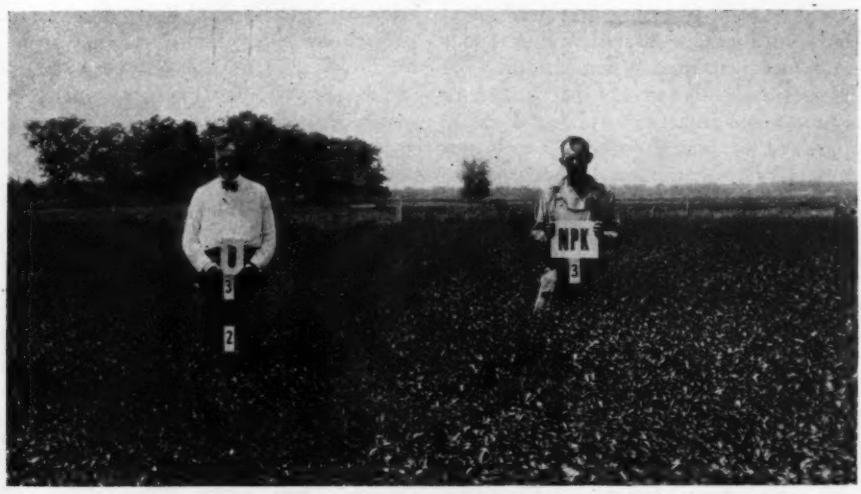
# *Pepping Up* PEPPERMINT *with* Potash

By Harry Gardner
Lafayette, Indiana




**Professor S. D. Conner of Purdue University Agricultural Experiment Station (left) standing in a no-treatment plot of a mint demonstration on the farm of M. H. Lake near North Judson, Indiana. Mr. Lake (right) standing in a plot of mint which received 250 pounds per acre of 3-9-18.**

IT is safe to say that every member of the great American family is familiar with the taste of peppermint. Few know how the oil is produced. Nearly a million pounds are consumed annually in flavoring chewing gum, candies, and bad tasting medicines; in drugs, as menthol for colds, and as a mild anaesthetic; in perfumes and in other varied uses. More than 75,000 acres of mint are required to produce such a quantity of oil. A dozen counties in the muck land area of northern Indiana and southern Michigan grow nearly two-thirds of the nation's requirements. Oregon, Washington, California and one or two other states furnish the balance.

Cutting mint fertilized with 0-8-32 on the farm of W. H. Lake, North Judson, Indiana. Mowing machine hidden by the tall growth.

There is no standard method for the growing of peppermint due to the lack of published experimental work on this crop. Mint growers handle it as their own individual experiences have taught them, resulting in varied opinions with regard to cultural methods and fertilization. When the price of peppermint oil was $25 per pound or even $5 and an acre of muck soil would produce 40 pounds of oil, it was not necessary to worry much about profitable methods of growing the crop. Now with the price of oil at $2 per pound and the yield of oil as low as 10 pounds per acre, methods of profitable fertilization are being sought.

### *New Practice Is Popular*

One of the newer practices in mint growing which is getting the hearty indorsement of many successful growers is the fertilization of the crop before plowing in the fall. Some information has been obtained along this line from two fertilizer demonstrations started in the spring of 1929 in Starke county, Indiana. One of these demonstrations was located on the farm of Roy Shankland near Hamlet and the other on the farm of M. H. Lake near North Judson.

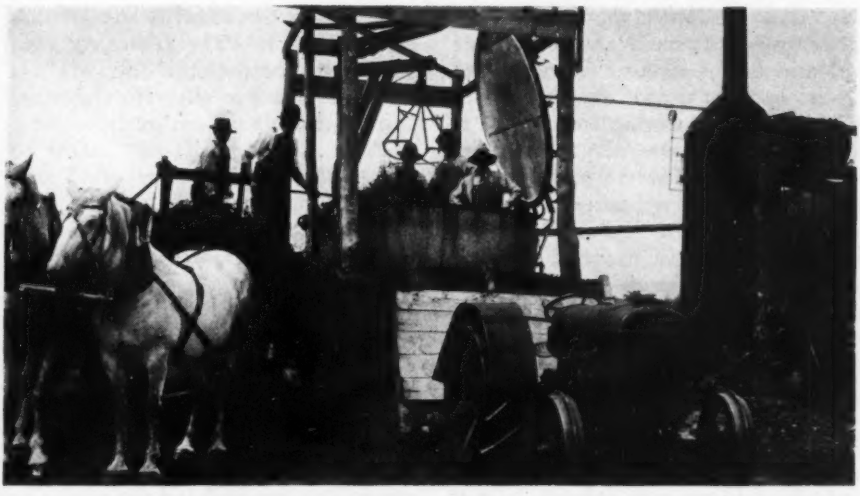
Four one-half acre plots in each demonstration received the same amounts of nitrogen and phosphoric acid in a mixed fertilizer while the amounts of potash varied from 22.5 to 67.5 pounds per acre. Then to get an idea of the value of nitrogen for mint on the high organic muck soil, two plots in each demonstration were laid out and received phosphoric acid and high potash mixtures but no nitrogen. In addition two plots were left untreated to show the results of continuous cropping without fertilization of any kind. Both demonstrations were supervised by county agent, W. K. Delaplane the first year and his successor, W. C. Haynes, this year. The two years' data are now available and are convincingly in favor of fall fertilization.

Little response in yields of oil was shown the first year when the fertilizer was applied in the spring. The check plots, receiving no fertilizer, produced as much peppermint oil as the fertilized plots which indicated that the mint grew on the residual plant food put in the soil by applications of fertilizer previous to the spring applications for the mint. The

Taking the steaming hot peppermint hay out of a tub after the oil has been extracted. This hay is dried and later fed to livestock.

second application of fertilizer was put on last fall before plowing. This year's data show decided changes in favor of the fall applications. The yields of oil this year on the unfertilized plots dropped sharply while the yields of oil from the fertilized plots in most cases were increased over the first year.

In the Shankland demonstration, the average yield of oil from the check plots was 27 pounds 8 ounces per acre while the average yield of oil from all fertilized plots, regardless of the fertilizer ratios used, was 33 pounds per acre. The lowest yield from the unfertilized plots was 24 pounds per acre and the highest yield from the fertilized plots was 35 pounds 8 ounces per acre. At the demonstration on the Lake farm, the unfertilized plots averaged 28 pounds and 8 ounces of oil per acre and all fertilized plots averaged more than 35 pounds per acre. The highest yield was 45 pounds per acre where 3-9-27 was used.



Tramping the cured peppermint hay into a tub where the oil is extracted by distillation.

### *Plenty of Potash*

Besides the trend in favor of fall applications of fertilizer for mint, the two years' data show a need for high potash fertilizers where the requirements for nitrogen and phosphoric acid are satisfied. On the Shankland farm this year $1.36 invested in potash returned $10.00 in peppermint oil, figuring the price of potash at six cents per pound when used in a mixed fertilizer containing nitrogen and phosphoric acid and the oil at this year's price of $2 per pound. Mr. Lake realized $24 in oil from an investment of $4.05 in potash.

Because mint production is restricted to relatively small areas in four or five states, methods of growing the crop may be of general interest. New fields are started by planting roots in rows three and one-half feet apart. The planting is done in the spring with roots dug from a field with an established stand of mint. Roots to plant an acre cost from $10 to $15. The first year the mint grows in rows but after that the roots spread and the mint covers all of the ground.

The mint is cut with a mower the same as any hay crop. It is raked when dry and taken to the distillery where the oil is extracted. The oil is in the leaves and great care is taken to get the hay properly cured with the least loss of leaves. Power mowers,

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# Make WHEAT Pay!

## *Combat Low Prices with High Acre Yields*

*Says* G. P. Walker

Purdue Agricultural Experiment Station

WHEAT fertilization has come to be almost a universal practice in much of the Midwest producing area, but with the present low price, many farmers are considering the question of whether it will pay to invest in fertilizer for this fall's seeding. While the market outlook is not bright, the situation may change before next wheat harvest when the full effect of the widespread summer drought has been realized. If low prices continue, high yields per acre are necessary for profit, and the lower the price, the higher the yield that must be produced to come out ahead.

Labor, seed, taxes, and land rent or interest make up the larger share of the cost of growing each acre of wheat, and these acre costs vary only slightly with low or high yields. Raising the yield per acre reduces the cost per bushel. Intelligent fertilization of the crop often changes loss into profit by increasing yields to the point where the total cost for each bushel is less than the price for which it can be sold. Regular fertilization of the crop seems the rational practice for the growers in the soft red winter wheat belt.

Another item that should be considered in fertilizing wheat is the effect on the other crops in the rotation. The results of long-time field experiments show that a large part, probably half, of the fertilizer plant food applied for wheat is left for succeeding crops. The increased yield and quality of the corn and clover in the rotation often pays for the entire cost of the wheat fertilizer.

### *Purdue Experiments*

Some practical information on what may be expected from wheat fertilization on Indiana farms is furnished by the results of field experiments conducted by the Purdue University Agricultural Experiment Station on a number of different soil types during recent years. In these experiments, guessing at the effects of treatments is largely eliminated as the tests are carefully conducted and the results are

**Unfertilized** **Fertilized**
**5.2 bushels per acre** **17.1 bushels per acre**
**An application of 300 pounds per acre of 2-12-6 fertilizer on wheat was the ounce of prevention for a bad case of winter-killing.**

**Unfertilized**
**25 bushels per acre**

**Fertilized**
**39 bushels per acre**

**An application of 300 pounds per acre of 2-12-4 fertilizer grew two shocks of wheat where one grew without fertilizer on the Experimental Farm at Lafayette, Indiana, this year.**

determined by weighing the crops produced and the materials used.

Two such experiments have been carried on the "black and clay" soil area of central Indiana for a number of years. On the experimental farm near Lafayette 300 pounds of 2-12-4 fertilizer costing $4.44 per acre on wheat have produced as an average of the last six years, 29.5 bushels per acre, while the unfertilized area has averaged 18.9 bushels. Three hundred pounds of 2-12-6 on wheat with 100 pounds in the row on corn have increased the average wheat yield on the Davis Forestry Farm in Randolph county from 12.5 to 23 bushels per acre during the same period. In both cases the increased clover and corn crops following the wheat have more than paid the cost of the fertilizer and left the 10-bushel wheat increase as practically clear gain. Wheat without fertilizer on the Davis Farm has been a consistent money loser.

At North Vernon on the light colored Clermont silt loam soil of southeastern Indiana, average wheat yields have been increased from 9 bushels on the unfertilized section to 17 bushels per acre over a 9-year period by the application of 200 pounds of 2-12-8 fertilizer. At Bedford, on the rolling limestone land of south central Indiana, the 12-year average wheat crop has been increased from 5 to 15 bushels per acre with 300 pounds of 2-12-4. In both cases the cost of these fertilizer applications and similar applications to the corn crop have been more than repaid by the increases of clover and corn crops following. On these soils satisfactory clover has not been possible except where wheat has been fertilized.

### *Six Bushels Net*

On the light colored Vigo sandy loam of southwestern Indiana on the Purdue Vincennes farm, 300 pounds per acre of 2-12-6 on wheat and 100 pounds in the row on corn have increased the 5-year average wheat yield from 15 to 21 bushels after manure had been used on the corn crop. Here again the full cost of the fertilizer has been returned by the increased clover and corn crops, leaving the six bushels of wheat per acre as practically net return for the fertilizer used. On the Princeton silt loam soil on this farm, 300 pounds of 2-12-6 per acre on wheat has increased the yield five bushels over the unfertilized with the increased yields of clover and corn practically paying the fertilizer bill.

On the light colored sandy soils of northern Indiana, more potash and nitrogen in proportion to phosphate are needed. On the Sand Experiment field near Culver on Plainfield fine sand soil the wheat on unfertilized land has averaged nine bushels per acre for the past three years. An ap-

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Hill applications of fertilizers gave the best results

# Boost Corn Yields

*By Rensselaer Sill*

University of Wisconsin

FARMERS in Pierce county, Wisconsin, have used commercial fertilizers to increase their yields of corn and other crops for a long time. It was not, however, until their county agent, Harlan Seyforth, ran a series of demonstrations on the best kind of fertilizers to use on corn that they discovered just how corn yields might be made larger through a wise application of the proper fertilizer.

Pretty nearly every place Mr. Seyforth visited he heard the question, "What's the best kind of fertilizer to use on corn?" It was one of those questions that kept popping up at farmer meetings, in the letters coming to his office, and at farm visits. In some counties, in fact in most counties, such a question would be relatively easy to answer. But in Pierce county there were no available experimental data on which the county agent could base an answer.

As the future of corn growing in the county depended to a considerable extent upon a correct answer to the question, Mr. Seyforth and some of the farmers decided to run a few test plots on the fertilizer needs of corn. The soil of the county ranges from a mellow clay loam to a stiff loam, so first of all he sent samples to the State College of Agriculture for analyses.

### *Fertilizer Tests*

Some 50 test plots were laid out and 20 different kinds of fertilizers applied. After watching the growth of corn on the plots all summer and after keeping careful records of growth and maturity, the corn was

husked by hand in September, divided into three grades, and weighed. Results from the test plots showed a decided difference in yields from different kinds of fertilizers and from the broadcast and hill applications.

On the farm of William Jacques near Prescott, the 4-12-8 and the 2-16-8 fertilizers applied in the hill at the rate of 175 pounds per acre produced an increased yield of 11 bushels over the check plots. Mr. Jacques, who is a champion seed corn grower and who last year sold more than $50,000 worth of seed, also found that the fertilized plots produced very little immature corn and almost twice as much No. 1 corn as the check plots. When he applied his fertilizer broadcast, he found that the yield was four bushels less per acre than was obtained by the hill application, showing that the hill method is much better for corn.

This year Mr. Jacques expects to produce about 20,000 bushels of seed corn, most of which will be golden glow, a popular Wisconsin variety. He is also growing large quantities of Wisconsin number 7 and Minnesota number 13 in addition to the registered number 37 barley and purebred wheat.

Another demonstration plot on the farm of George Wild near Elm Rock, showed the need of a high potash fertilizer for corn, such as a 2-12-12. This kind of fertilizer increased the yield of No. 1 corn by 11 bushels per acre and hastened the maturity.

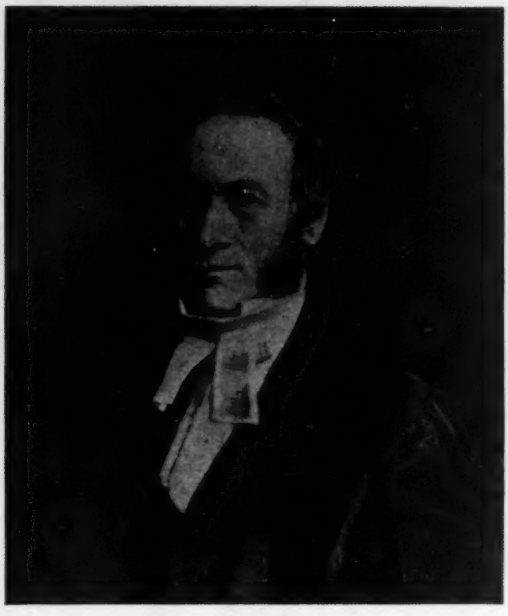
### *More No. 1 Corn*

On some of the other test plots throughout the county, Mr. Seyforth found that a 4-16-8 applied at the rate of 175 pounds per acre was responsible for an increase of 13.10 bushels of No. 1 corn and No. 1 nubbins, a 4-12-8 increased yields by 12.29 bushels, and a 2-16-8 resulted in an increase of 12.25 bushels.

Several other kinds of fertilizers also gave good results, but those with a phosphate content of from 12 to 16 per cent and carrying about 8 per cent potash did best. Two per cent nitrogen seems to be sufficient for

(*Turn to page* 52)

**The difference that fertilizers made in pasture yield.**



REV. PATRICK BELL.

# *The* Inquiring Mind *and the* Seeing Eye

*By Dr. A. S. Alexander*
University of Wisconsin

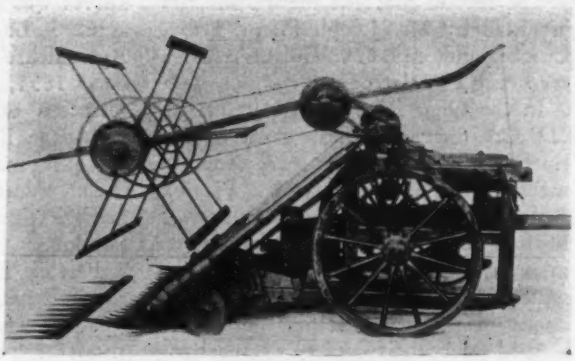
IT'S a far cry from the days of the Stone Age, when the sickle was first used for the harvesting of grain, to those of 1930, when the tractor-operated harvester-thresher, cutting a swath 16 feet wide, with two men operating the outfit, covers 45 to 55 acres in a 10-hour day. And what back-breaking toil modern implements have ended!

I can look back to the early seventies, in Scotland, when six sickle reapers and one hand-binder of sheaves did well if they cared for six acres of grain in one long day and when the cutting of two acres of grain was a big day's work for a man with the scythe. The "cradle" was an improvement on the earlier implements, but crude and wearisome to operate. I once cut seven acres of heavy oats with it in a new Iowa orchard where the little apple trees had been set out but 30 feet apart each way and am sure the agricultural student of today would call that "some job." It was!

No wonder, then, that men of inquiring mind and seeing eye have,

since time immemorial, been trying to find a better method of harvesting their crops of wheat, rye, barley, and oats.

We use the word "immemorial" a d visedly, for the reaping machine is a much more ancient implement than many people suppose. Both Pliny and Palladius describe one that was worked by oxen and much used in the grain fields of the ancients. Pliny said of it: "In the extensive plains of Gaul large hollow machines are employed, with teeth fixed in the fore part, and they are pushed forward on two wheels through the standing corn (small grain) by an ox yoked to the hind part. The corn cut off by the teeth falls into the hollow part of the machine."

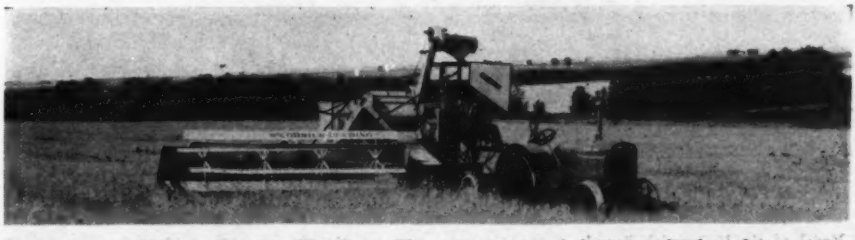


**Bell's Scottish Reaping Machine of 1828, from a photograph of it as it now exists in South Kensington Science Museum. The original cutters are seen lying in front of the machine.**

Those were "stripping" or "rippling" machines and, in a measure, similar to "headers" of more modern times. The sickle, however, remained the chief harvesting implement in Europe until the beginning of the nineteenth century. The cradle seems to have been more generally used in America.

Inquiring into the history of the earliest reaping machine we find that in the British "Quarterly Journal of Agriculture" Vol. 1, 1828, p.p. 136-7 an author signing himself "D. C." has an article entitled "On the Use and Advantages of the Reaping Machine." Quotations from that article are made by Professor James Hendrick, of the University of Aberdeen, Scotland, in the Transactions of the Highland and Agricultural Society of Scotland for 1928 in which he treats of the centenary of the reaping machine.

The first machine mentioned by "D. C." was produced in 1812, by Mr. James Smith, Manager of Deanston Cotton Works, Doune. A committee of the Highland Society having inspected and tried this machine earnestly recommended that the Society present the inventor with 200 guineas "as a mark of their appreciation and as an encouragement to labor for the public good." This was in 1815. The writer admits, however, that the machine was not a success. It had a circular cutter and was pushed into the standing grain, as was the earliest machine of shear-like, cutting-knife pattern.



**The McCormick-Deering Harvester-Thresher. The tractor-operated harvester-thresher shown cuts a swath of 16 feet and, with two men operating the outfit, can cover from 45 to 55 acres in a day.**

The second machine mentioned was invented by Mr. Joseph Mann, Raby, Cumberland, in 1820, and also had a revolving circular cutter.

In the Quarterly Journal article by "D. C." mention is also made of the third notable reaper, a very hopeful machine "invented by Mr. Patrick Bell, a young man in the County of Forfar, Scotland, of high attainments in many of the sciences;" and in the same issue appears an illustrated account of Bell's machine which is termed "a beautiful piece of mechanism."

### *One Acre Per Hour*

The next issue of the Journal (November 1828) gives an account of trials made with the Bell reaper which was operated by one horse and cut about one acre of oats, barley, or wheat per hour, and could be made for about £30.

The "Working of Bell's Reaping Machine" is further described in the Quarterly Journal, Vol. IV, 1832, and it is reported to have been working for some years. Details are given as to the number of machines that had been working, and as to the acreage cut by them in each year. It is stated that in 1832 ten machines were at work which cut among them 320 Scotch acres. When all conditions were right, one of the machines could cut 12 acres a day. Sharpening of the knives was necessary after cutting 50 acres. Loudon's Encyclopedia of Agriculture Vol. I, 2nd edition, London, 1831, also contains a full description of Bell's reaper, with two full page illustrations. The original machine, made by Bell is still in existence. Years ago I saw it in the Science Museum at South Kensington, London.

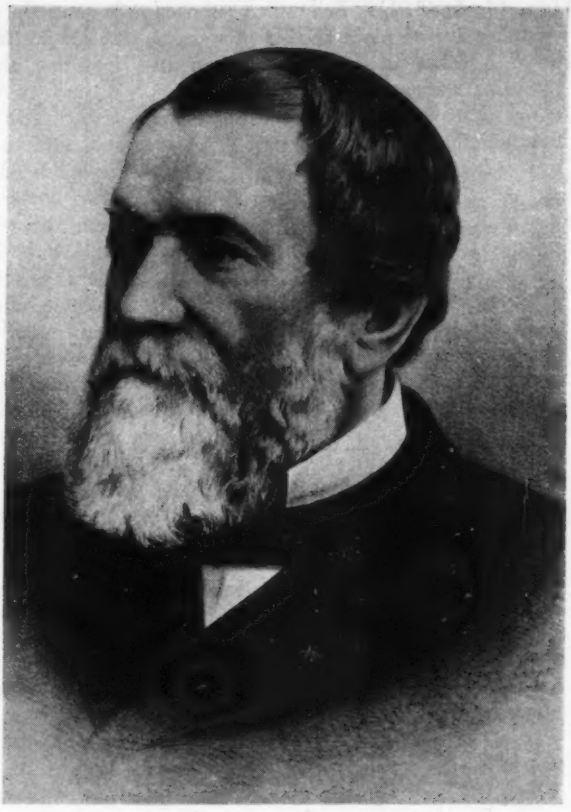
Patrick Bell, inventor of the 1828 reaping machine was the son of a small Forfarshire farmer, and was about 27 years old when he made his first machine. After living on the farm for some time he worked his way through St. Andrews University where he took his M. A. degree. He was a divinity student at the time he invented his reaping machine, always had been interested in machines, and continued making models of machines and implements after he became parish minister of Carmyllie in Forfarshire.

While living on his father's farm he also set up a small plant and from it lighted the farm house with gas, to the astonishment of the neighborhood. The use of gas at that time was unknown, except in some of the large cities. As a further evidence of young Bell's skill and progressiveness it may be mentioned that he grew beets on his father's farm and manufactured sugar from them which he sold to a merchant in Dundee. That was in 1828, or thereabouts, at which time

**Model of the McCormick Reaper of 1831 in use. It required a boy to ride the horse, a man to rake off the cut grain, and six others to bind the sheaves. The capacity of the outfit was 12 acres a day.**

the beet sugar industry was entirely confined to comparatively limited districts on the Continent.

After completing his divinity course at St. Andrews, Bell lived for a time in Ontario, Canada, not far from Guelph, acting as a tutor and occasionally preaching in the church of a Scottish settlement. He left Canada in 1837 and spent the rest of his life at Carmyllie, where he died in April, 1869. In the public library at Guelph may be seen photographs of Bell and his reaper. It is also stated that Bell had with him in Canada a model of his machine and that he left it behind him when he returned to Scotland; but, if so, it has been lost.



Cyrus Hall McCormick (1809-1884)
Inventor of the first practical American reaping machine.

Relative to Bell's reaper, which seems to have been the most notable machine of the early ones invented and the only one that survived and did profitable practical work in the field "The Book of Farm Implements and Machines," published in 1858 says: "It is known also that four of the machines were sent to the United States of America; and this circumstance renders it highly probable that they became the models from which the so-called inventions of the American reapers have sprung."

It would seem from an article in the 1865 issue of the Transactions of the Highland and Agricultural Society, quoted by Professor Hendrick, that certain of the earlier machines which appeared before Bell's machine of 1828 "had cutters which worked with a reciprocating motion applied to a tooth knife which worked between teeth or projections." Such an arrangement somewhat resembles the cutters of the present day, and also resembles, in certain respects, the shears used by Bell in his machines.

### *To Secure Agriculture*

When the reaping machine came into general use, after the great Exhibition of 1851, the part which Bell had played in its development was recognized, and various honors were bestowed upon him, including the degree of L.L.D. from his *Alma Mater*, the University of St. Andrews.

At the General Meeting of the Highland and Agricultural Society on

Jan. 15, 1868, Dr. Bell was presented with a piece of plate and £1000 "by a large number of his countrymen in token of their appreciation of his pre-eminent services as the inventor of the first efficient reaping machine."

It seems unfortunate that Bell did not patent his invention. Many of the machines made from his model by ignorant and incompetent workmen were unable to work more than a few years. Relative to this Bell said: "Had I patented the machine at the time, all this bungling in machine-making would have been avoided; and the issue perhaps proves that, for the public benefit even, this was the prudent course to have been adopted. But I was always averse to this step being taken. *I wished the implement to go to the agricultural world free of any extra expense.*"

Those assuredly were the honorable motives of a true research scientist. As Professor Hendrick says: "He was a farmer's son, who had worked in the fields at harvest, and knew the severe nature of the toil to which harvest workers were subjected. He wished to present his invention freely to the agricultural public, and not to add to its cost by any royalties or profits accruing to himself."

At the time of its invention great prejudice against machines existed among farm laborers. The poor quality of the machines first made by careless or incompetent workmen also prevented the new invention from becoming popular. No manufacturer of agricultural machinery appears to have taken up Bell's machine until after 1850. Even in America, where labor was much scarcer and dearer and where agriculture occupied a much more important position than in Great Britain, the reaping machine made very slow progress.

Cyrus Hall McCormick built his first reaper in the old log cabin blacksmith's shop on his father's farm near Steele's Tavern, Virginia, and in the fall of 1831 gave it a practical trial. It was drawn by a horse, instead of being pushed into the grain like Bell's machine, and when given a fair chance is said to have "sailed along in fine trim." In less than half a day the machine had cut six acres of wheat—as much as six men would have done. One horse pulled the machine. One man drove the horse and another walked beside the machine and raked the gavels to the ground. Other men followed in the field and bound the grain into bundles at the rate of about two acres per man, per day. Later, the machine was pulled by two horses, and provision was made for the man with the rake to ride on the machine, facing the rear. Still later (1863 to 1875) the self-rake reaper came into common use.

### *Big Business*

As was the case in Scotland, American farmers seemed loath to give up their old methods and adopt new and better ones. The selling of the new reaper was, therefore, a problem. During the 10 years following the invention of the McCormick reaper in 1831 not a single machine was sold. In 1841, however, two reapers were sold and sales then slowly increased. When an order for eight machines came from Cincinnati, McCormick began trying to interest capital in his invention and finally got a firm in Brockport, N. Y. to make 100 machines. In two years, after leaving Virginia, 240 reapers were sold; then McCormick entered into partnership with W. B. Ogden in 1847 and built a factory in Chicago. Later, he bought out Ogden and established the business which today has grown to such huge proportions and importance under the name of the International Harvester Company. By 1859 there were 50,000 reapers in the United States doing the work of 350,000 men, saving $4,000,000 in wages and filling the granaries of the country with some 50,000,000 bushels of grain.

(*Turn to page 57*)

# *The Distribution of—*

# Moisture

*By L. F. Jonas*

Ames, Iowa

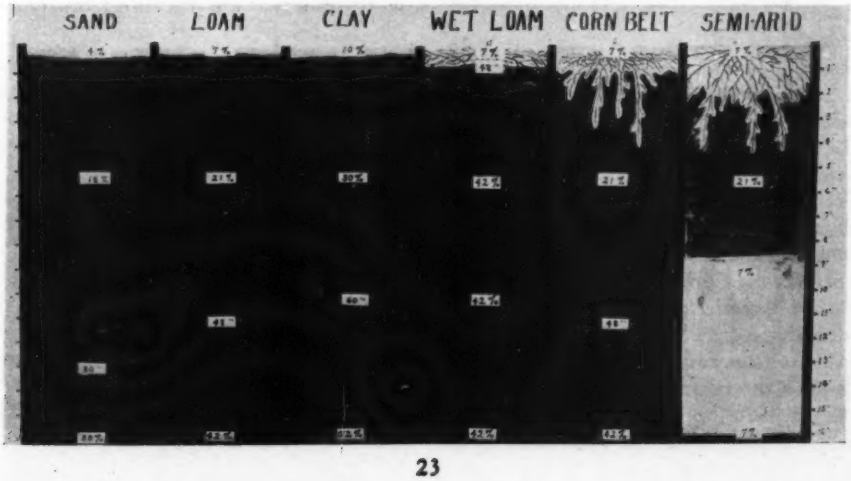
TO cultivate or not to cultivate! Some farmers are ignoring the problem. Others are puzzling over it. Still others are accepting the most recent findings of scientific men and if they are cultivating at all, their cultivation is shallow.

Having a heavy bearing on the problem is the question, does water continually come from the water table to the surface or to the root zone of crops? There has long been a tendency to believe that it does. On the other hand, much investigational work has been done which would seem to disprove this, and to determine the relative distances that water will move above a water table and the effect that different types of soil have on this movement.

To present the latest conclusions of nationally known authorities on the subject, Harold D. Hughes, professor of farm crops at Iowa State college, Ames, Iowa, and Edwin R. Henson, assistant professor in the same department, co-authors of a book, *Crop Production,* on the press this summer, have devoted a part of the book to the results of recent investigational work.

In harmony with the conclusions they have drawn, the amount of cultivating done on the agronomy farm at Iowa State College has for some time been lessened, and what cultivation is done is relatively shallow. In general, there is no cause to cultivate, they believe. If farmers who cultivate to eradicate weeds would fight them

**A chart drawn by Professor Henson showing at the bottom the extent of the water table in the various soils, and above, the per cent of water at different levels, and at the top, the per cent in inches the water rises above the water table.**



other ways, it would be so much the better for their crops, they declare.

According to Mr. Henson, the new idea is fast taking hold and the use of shallow cultivating implements, the drift harrow, for instance, is becoming widespread.

Mulch paper is also being used with good results on the college gardens, entirely substituting cultivation.

Some of the experiments made by scientific authorities, upon which Professors Hughes and Henson have based the conclusions on water in relation to plant growth as set forth in their book, follow:

Limitation of capillary rise has been demonstrated by experimenters, in tubes 4, 6, 8, and 10 feet long and 8 inches in diameter, filled with sandy loam and Yolo loam soils. They were run in duplicate at Berkeley and Davis, California. The water evaporated from the surface in one month, as shown by the following table, gives a measure of the small amount raised by capillarity from a wet soil with free water at various distances below the surface:

| Height Above Free Water | Inches of Water | |
|---|---|---|
| | Berkeley | Davis |
| 4 feet | 1.57 | 3.50 |
| 4 " | 2.10 | 3.69 |
| 6 " | .54 | 1.85 |
| 6 " | .70 | 1.99 |
| 8 " | .00 | .97 |
| 8 " | .15 | 1.03 |
| 10 " | .00 | .16 |
| 10 " | .00 | .17 |

Capillarity in soils ceases when the diameter of the particles is more than 2 mm., and it varies with smaller particles in proportion to their fineness; the finer the particles the greater the lifting power, but the slower the movement, another quoted authority declares. Conclusions from the same source are that loss of water by evaporation from water underneath the soil surface decreases as the distance between the surface of the water and the surface of the soil increases.

A report from the New Mexico experiment station is that the maximum height that moisture will rise in soil-filled tubes set in water is: in a sandy soil, 32 inches, and in a clay adobe soil, 50.5 inches. It was found that there is but little movement of moisture from a wet into a dry soil, although moisture will move 30 inches from a wet soil to the roots of wheat.

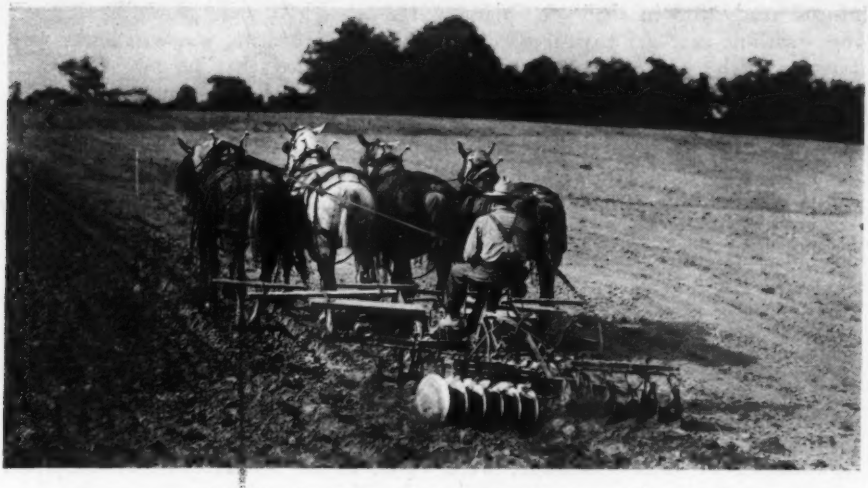
### *Downward Percolation*

In the matter of retention of moisture, it has been found that a soil kept mulched by placing a fine, dry layer on the surface lost 0.73 inches of water from the first foot, while an unmulched soil lost 1.52 inches of water during the summer as an average for three years. In the second foot of soil, the loss was 0.02 and 0.46 inches, respectively, and 0.00 and 0.04 inches for the third foot. This loss seems to indicate a moisture movement upward without a water table. In this experiment, mulch inhibited the absorption of water by increasing the amount of water held in the mulch. It has been shown that in the case of a moderate rain, the mulch may take up all the moisture and none of it will penetrate deeply into the soil.

Distribution of moisture in Nebraska soil, at intervals through a period of 17 months, in shown on page 55. The water table was subject to fluctuations varying from 17 to 20 feet below the surface.

It has been determined that when soils are thoroughly moistened and then protected from losses by evaporation they lose water by downward movement. "The downward movement will continue until the ratio of moisture content to hygroscopic coefficient lies between 1.8 and 2.5. When this downward percolation ceases, the soil contains only capillary and hygroscopic moisture. The moisture in the subsoil is able to move upward only slowly and such a short distance in a single season that it will

(*Turn to page 55*)



The disc harrow has ruined many an asparagus bed.

# Tons *of* Asparagus

*By E. R. Lancashire*

Ohio State University

AN acre of asparagus set out in 1900 has been producing at the rate of 3,000 pounds annually and the average net income per pound has been 15 cents. The asparagus bed on this general type of farm has returned about $450 each season.

This story, related by M. H. Rogers of Solon Road, Xenia, Ohio, could, no doubt, be duplicated in many parts of the United States. The interesting feature about this story is the soundness of the observations made by Mr. Rogers concerning the growing of this particular crop. The 40-odd tons of asparagus produced on this acre during the past 30 years is not just chance.

The marketing of a ton and a half of asparagus annually is done locally by Mr. Rogers. When the planting was young, he shipped the crop to Toledo. Conditions have changed, and the once distant market is not now as profitable as the local one. Fresh, green, tender asparagus is better appreciated at home than it used to be. To insure the customers the highest quality of "grass," as he calls it, Mr. Rogers has developed a definite schedule of handling this crop. Among the several things which he pays particular attention to are liming, fertilizing, cultural practices, and the harvesting of the crop.

Years ago, when the idea first developed, special care was taken to select the most fertile and well-drained acre of soil available. In fact, Mr. Rogers took two years to get this acre

of soil ready and in shape for planting with one-year-old asparagus roots. First of all he selected a piece of red clover sod. If he were doing it today he stated that his choice would be alfalfa sod. He has noticed that it takes good soil and good farming to make a real alfalfa sod.

Just before the sod was turned under in preparation for the asparagus planting, the acre was liberally covered with manure. The rate was 20 tons per acre. The following season a cultivated crop was produced and that fall another 20 tons of manure were applied. This program was repeated the next year. In this way upwards of 60 tons of manure were mixed into the future asparagus seedbed. Rogers believes that well-mixed soil and manure is better than anything else for asparagus.

### *Neutral Soil*

During the second year in a cultivated crop, Rogers put on the acre several loads of limestone. Perhaps his unusual success with asparagus is due to this precaution. Asparagus grows best in a soil which is nearly neutral. An acid soil will not produce a good asparagus bed.

When the one-year-old roots were first planted in this acre of soil, they were in rows five feet apart and the distance between plants 20 inches. Today the planting looks as though it had been made broadcast. All evidence of the row method of planting used has disappeared as the years rolled along.

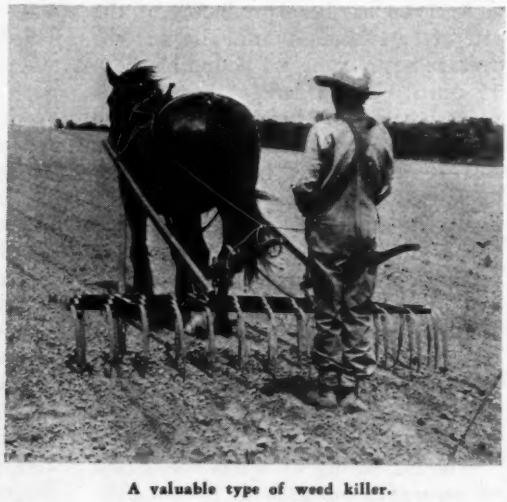
An asparagus bed an acre in area is a costly piece of property to acquire and will prove a good investment only when properly handled. The record made by Mr. Rogers is evidence enough that the methods he uses are sound and practical.

Half of the one-year-old roots used were purchased and the other half were grown by Rogers. After the planting was well under way he concluded that he might as well have grown all of them for by so doing he could have had more roots to select from. He believes that only the largest roots with the buds well distributed on the crown should be planted.

The years have brought Mr. Rogers a method of justifying his use of large amounts of fertilizer. He saw somewhere a chemical analysis of the elements which are found in asparagus. For example he found in this report that calcium, supplied through lime applications, played a very important part in the manufacture of the fibers found in asparagus. The market favors the large, thick, dark green spears of asparagus and this report told Rogers that nitrogen was of great importance in helping the plants to manufacture this color, as well as proteins, and to promote a fast vegetative growth in the early spring. Iron and magnesium play an important part in the color manufacturing process of asparagus.

The two other important fertilizer elements used by most plants, potash and phosphorus, were also highly profitable in connection with asparagus.

(*Turn to page* 53)



A valuable type of weed killer.

# No Flax Surplus

*By W. Carl Dorr*

Bedford, Iowa

ONE crop that can be grown profitably in Minnesota, North and South Dakota, Montana, and parts of Iowa and Wisconsin is flax. There is no surplus production in this cash crop which has had an average consumption of 40,650,000 bushels in this country and an average annual production of 21,865,000 less the sowing supply in the period 1924-1928. The July 1 estimate of the 1930 crop was 30,100,000 bushels. The new tariff law raised the rate on flaxseed from 40 cents to 56 cents per bushel, and the old rate of 3.3 cents per pound on all linseed oil imported is still effective.

As long as it is necessary to import millions of bushels of flaxseed each year (20,250,000 bushels in 1929) this crop will continue to increase in acreage, and especially so with the new high tariff now in effect. This cash crop has shown a higher gross income per acre than spring wheat or oats for each 5-year period from 1909 to 1928 in North Dakota, Minnesota, South Dakota, and Iowa.

An effort is being made in Iowa to increase the 1931 acreage materially. Experiments are being carried on at the Iowa Experiment Station, Ames, for the first time in a number of years. The time of planting is being studied with three different dates. The use of a commercial powder for treating the seed has shown the power to double the stand.

Prof. H. D. Hughes of the Iowa Station is of the opinion that flax may be adopted in the rotation system in the place of oats, always a very low paying crop. He says that flax should be planted about the same time as oats on ground that has been worked down to a firm seedbed, in which there are no air spaces. The ground should be as free of weeds as possible. If, on account of weeds or any other reason, one must sow late, from one-third to one-fourth more seed per acre should be planted. Approximately 30 pounds of Buda, Linota, or North Dakota Resistant No. 114, or 35 to 45 pounds of Bison should be planted per acre by means of a drill.

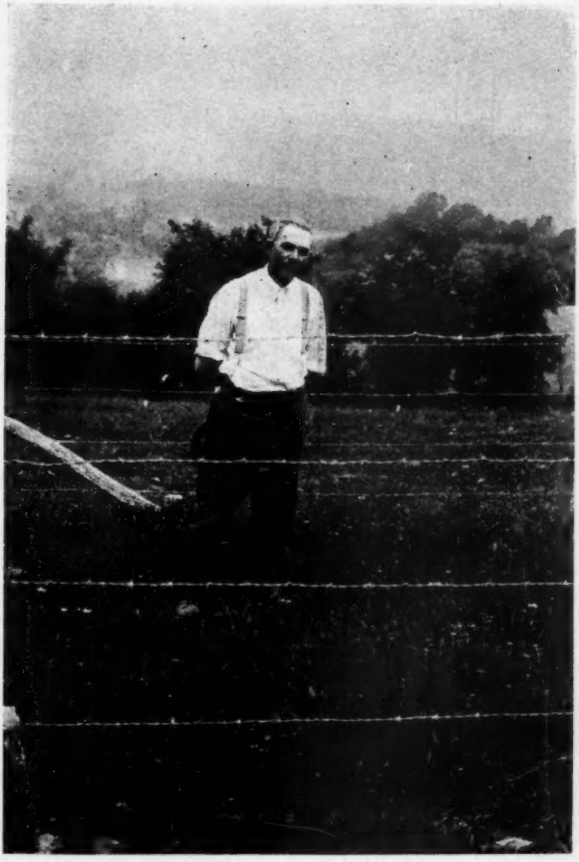
Despite the fact that flax is a crop relatively free from destructive diseases one should secure certified seed of the wilt-resistant varieties, as the ones named above, or Redwing or Chippewa. One should be especially careful to plant only clean, bright seed. If the weeds can be controlled, the earlier plantings usually give the larger yields. The average yield in Iowa has been around 11 bushels per acre, while under the best conditions as much as 20 bushels are secured.

Planting flax as a mixture with

(*Turn to Page* 53)

# Pasture

*By*
*E. K. Walrath*
Westminster, Maryland

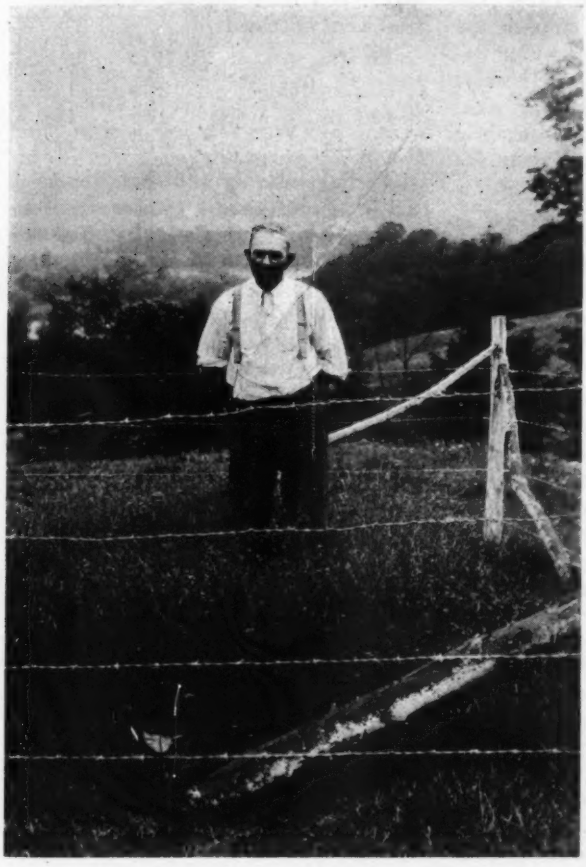


THAT pastures can be made highly productive by top-dressing with fertilizer and lime without the expense of plowing and reseeding has been demonstrated by two years' work in Bradford county, Pennsylvania. In the spring of 1929 five sets of fertilizer plots were started on two farms so as to get a range of sod conditions typical of those found on Bradford county farms. Two sets of plots were put on the farm of Enos Granger near Towanda while three sets of plots were established on the farm of L. and I. Brown, at Ulster.

Based on the amount of good pasture grasses and clover, these sods ranged from good to very poor. The good sods were composed of Kentucky bluegrass, bent grasses, and white clover with some weeds. The poor sods were composed largely of weeds such as paint brush, sorrel, cinquefoil, and daisies, and yarrow, yet the good grasses and clover, though small, were still present. In the poorest sod the weeds had practically replaced all grass and clover. This poorest sod was the only one where top-dressing with lime and fertilizer was not effective. Here the land has had to be reseeded to Kentucky bluegrass and white clover.

On the farm of Enos Granger, one set of plots was located on a thin sod composed largely of devil's paint brush (hawkweed), sorrell, and cinquefoil but in which bluegrass and

# Top-dressing



**This pasture plot was fertilized April 29, 1929, with 1 ton of ground limestone and 1,000 pounds of 5-10-10. April 10, 1930, it received 250 pounds of sulphate of ammonia. From May 14 to June 19 it yielded 8,168 pounds of green weight as compared to 1,513 pounds for the plot on the opposite page which was not limed or fertilized.**

white clover, though small, could be found. Limestone at the rate of a ton to the acre was used on part of the plots. Superphosphate was used alone and in combination with lime, muriate of potash, and nitrogen.

### *Comparison of Treatments*

The different plots were fertilized at the rate of 1,000 pounds per acre of the following grades of fertilizer: 0-10-0, 0-10-0 and lime, 0-10-10 and lime, and 5-10-10 and lime. Another plot had 500 pounds per acre of the 5-10-10 fertilizer and lime. Part of each of these plots as well as unfertilized areas were fenced off so the cattle could not graze them. Clippings were made through the pasture seasons in 1929 and in 1930.

Taking the green matter produced on the unfertilized plot as 100, the different treatments gave the following yields in 1929 and 1930:

| Plot | Treatment | 1929 | 1930 |
|---|---|---|---|
| 1 | unfertilized | 100 | 100 |
| 2 | 0-10-0 | 104 | 123 |
| 3 | 0-10-0 & lime | 156 | 129 |
| 4 | 0-10-10 & lime | 262 | 230 |
| 5 | 5-10-10 & lime* | 320 | 362 |
| 6 | 5-10-10 &lime** | 643 | 542 |

*500 *pounds* 5-10-10 *per acre, nitrogen only repeated in* 1930.

**1,000 *pounds* 5-10-10 *per acre, nitrogen only repeated in* 1930.

*Lime, phosphorus, and potash applied to all plots only in* 1929.

The first year of the test, phosphorus alone was no better than the unfertilized area. In 1930 the yield had increased 23 per cent. Lime-phosphorus increased the pasture 56 per cent the first year, the increase being largely clover. In June, 1929, the clover leaves on this plot showed the regularly-spaced white spots which denote potash starvation. In 1930 there was very little clover on this plot, which accounts for the relative drop in production from the first year.

### *No Sign of Starvation*

The plot which received lime, phosphorus, and potash had far more clover and no signs of potash starvation. In 1930 the clover still persisted on this plot and this accounts for the greatly increased yield. The two plots having the complete fertilizer were the only ones on which the Kentucky bluegrass was greatly stimulated. The high production of this grass when adequately fertilized is shown in the figures above. In 1930 the nitrogen was applied again to these two plots and the bluegrass gave a tremendous growth.

The plots on the better pasture at Granger's were not fenced in 1929 so no yields could be taken. In 1930 the fence was not put up until after the cows had grazed all plots closely. The fence was put up on May 14 and yield records were made on June 18.

During this period the unfertilized plot produced 1,513 pounds of green matter per acre, while the complete fertilizer plot produced 8,168 pounds. The unfertilized plot produced mostly weeds, while the complete fertilizer produced practically clear bluegrass. On this sod all of the treatments showed that they were producing results.

On the farm of L. and I. Brown, three sets of plots were established in 1929. The first set of plots was on a good sod composed largely of Kentucky bluegrass. The treatments here were unfertilized, compared with 400 and 800 pounds per acre of a 6-8-6 fertilizer. Limestone at the rate of one ton to the acre was applied in the spring of 1929. The fertilizer was applied in 1929 and 1930. Taking the production of the unfertilized plots as 100 in each year, the following results from the use of the fertilizer were obtained:

| Treatment | 1929 | 1930 |
|---|---|---|
| Unfertilized | 100 | 100 |
| 400 lbs. 6-8-6 | 165 | 188 |
| 800 lbs. 6-8-6 | 229 | 290 |

These results showed that this good sod responded greatly to complete fertilizer. Even with the 800-pound application the point of diminishing returns had not been reached. The fertilized plots also came through the extremely dry year of 1929 in better shape than the unfertilized plots as is shown by the production in 1930.

On the fair sod at Browns' the story is about the same as at Granger's. The plots used were the 0-10-0, 0-10-0 and lime, 0-10-10 and lime, and the 5-10-10 and lime. The 0-10-0 both with and without lime was relatively ineffective. The clover was greatly increased on the 0-10-10 plot while on the 5-10-10 plots Kentucky bluegrass was brought from a position of being merely present to the point where it produced real feed and replaced the weeds. On the very poor sod in which there was practically no clover or good grasses, none of the top-dressing treatments was effective. In the spring of 1930, these plots were gone over with a springtooth harrow and were seeded to Kentucky bluegrass and white clover.

### *Early Grazing Pays*

This work with five sets of plots on two Bradford county farms shows that on all but the poorest pasture sods top-dressing with lime and fertilizer will greatly increase the productivity. The use of phosphorus alone and with lime was relatively ineffective because lack of potash and nitrogen were limiting production

(*Turn to page 57*)

# TORNADOES

*By Solon R. Barber*

Washington, D. C.

TORNADOES are wind, and for more than 50 years different Government agencies have been measuring tornadoes, collecting facts and figures attempting to assemble them in some helpful way. Tornadoes, of course, vary in intensity from the great, swift howlers that sweep across Kansas and Nebraska to the pretty little "whirlwinds" that toe-dance like graceful, tall, grey ladies across the deserts of the West. Tornadoes do incredible things.

Mr. P. C. Day of the Weather Bureau tells of tornadoes that lift iron beams, that raise houses off their foundations, and carry children through the air and deposit them, unharmed, some distance away. These stories, accurate, differ considerably from the ones veteran ranchers used to tell me in a mock serious way. Everyone has heard of the swift wind that blows chickens through barn walls and places donkeys on the towers of churches.

In recent years, climatologists and other scientists have found ways and means of measuring tornadoes more accurately. But it has not always been so, and Mr. Day says that lack of weather-reporting stations in certain districts where these storms occur and an early general lack of population over some of the lately developed territories in the tornado area made it impossible to secure the full facts needed from certain regions until rather recent years.

### *A General Study*

The Signal Service made quite an intensive study of the occurrence of "six hundred tornadoes" during the 87-year period from 1794 to 1881. While the period covered was a long one, still the study was little better than a general one inasmuch as it was by no means a complete one. The figures presented afforded no means of correctly interpreting the comparative frequency of tornadoes over different parts of the country, or in the different parts of a single state.

The Weather Bureau gathered and published the details of tornadoes occuring in the period from 1889 to 1897, but again the data were not

In the wake of a cyclone which covered only a narrow strip near Johnstown, Colorado.

representative of all parts of the country.

In 1916, the Weather Bureau again undertook to collect tornado statistics on a uniform basis for all sections of the country. And by that time, the areas where these storms are most frequent had become more fully populated and means for securing information had become widespread. It was felt then, and is felt now, that it is pretty hard for an important tornado to get by without being seen and measured. Since 1916, the Weather Bureau has worked out a system of presenting graphically the presence of tornadoes by areas of 10,000 square miles each. The Weather Bureau has divided the United States into such areas and within these squares each year is placed the number per year of tornadoes that occur. The Weather Bureau has a map which shows these facts for a 13-year period—1916 to 1929.

A study of this chart shows that most tornadoes occur over extreme northeastern Kansas where the average number of these storms for the period was slightly more than three per year. Numbers nearly as high are found in nearby sections of Nebraska, in central Arkansas, and over the greater part of Iowa. Over the less elevated portions of the country, between the Rocky mountains and the Appalachians, tornadoes are less frequent, but distributed fairly equally. The frequency decreases westward quite rapidly as the Plains rise into the Rockies and tornadoes are much less frequent west than east of the Rocky mountains. The inter-mountain states have had practically none during the period under study. Tornado-frequency also diminishes rapidly as we go northward and tornadoes become somewhat rare near the Canadian boundary. They are mainly less frequent in the East than in similar latitudes of the Mississippi valley. While tornadoes diminish toward the Gulf Coast, they are quite likely to occur in Florida. However, Mr. Day says that any important area east of the Rocky mountains is apt to be visited occasionally.

What is a tornado? Mr. Day defines it as a local wind, whirlwind, of great velocity, generally accompanied by rain, thunder, and lightning. It is almost always characterized by a funnel-shaped cloud that appears to hang from the bottom of a much greater cloud mass above. The wall of the funnel, of 50 to a few hundred feet in diameter, is made up of a mass of violently whirling air with strong ascending components. The whole system travels, in general, from southwest to northeast, in a narrow path which may be from a few feet to a quarter of a mile wide. A tornado generally travels from 30 to 40 miles an hour. The length of the path varies from a few miles up to 200 miles or more.

### *Where Tornadoes Occur*

Tornadoes, says Mr. Day, usually occur in the southeast quadrant of an advancing low-pressure area and seem to be formed at the cloud level by the passing of a cold northerly current by a warm current from some southerly direction. Where these winds meet, a whirl may be set up. When this descends toward the earth, it reaches the ground as a wildly rotating wind column of varying dimensions that moves generally in a northeasterly direction.

What time of year are tornadoes most likely to pay us an unwelcome visit? That is an important question. Fortunately, the Weather Bureau has figures for the period of 1916 to 1928 inclusive. Striking an average for months and years during the period, we find that May and June (with 22.8 tornadoes each, average for the whole period, for the whole country) hold the honors. The average number of tornadoes during the period for April was 20.3. March had 11 and July 9.1. January, 2.1;

(*Turn to page* 50)

# New Fruits

*by*

E. N. Bressman
Oregon Experiment Station

THE old order changeth and we have new styles in fruit as well as in miladi's dress. Plant breeders all over the world are busy producing new varieties which are higher yielding, more hardy, and more pleasant to the taste than the fruits being grown at the present time. It is doubtful that many of our present-day varieties will be grown by the second generation from the present. Valuable new varieties are available at the present time.

There appears to be an insistent public demand for red color in the apple and everyone is looking for a red "sport." Berries of large size and deep color are bringing a premium in most markets. Canners are demanding berries which retain their bright color when preserved. Tourist trade and roadside stands require varieties which ripen early and at the time when folks are on the highways. Even varieties which will not stand shipment are coming into use for the tourist trade.

It must be remembered that all of the varieties mentioned herein are not adapted to all conditions. Under environmental conditions which are similar to those where the varieties originated, it can reasonably be expected that the new fruits are worthy of a trial. In most cases it is best to try out a limited number of plants rather than put out an entire plantation. Growers of tree fruits must be certain of the varieties that they plant.

There are several new apples which are worthy of mention. Some of these are Staymared, Carlton, Newfame, Red McIntosh, Crimson Beauty, Cortland, Melba, Joyce, Milton, Macoun, Early McIntosh, Starking, and Anoka.

The Staymared is a "bud sport" of the Stayman Winesap. It was found at the Moomaw orchard in Virginia. Most of the "sports" in apples are inferior to the parent. The Staymared, however, appears to differ from the parent in color only. The dark, red color of this new variety should bring joy to the hearts of those who are looking for red color in the apple.

The Carlton was originated at the New York Experiment Station at Geneva. It is the result of a cross between the varieties, Montgomery and Red Astrachan. This new variety is characterized by large size and tart taste. The statement has been made that Carlton has all of the good characteristics of the well known Red Astrachan parent but none of its faults.

Newfane was originated by the same station and is of the Delicious type. It is the result of a cross between the varieties, Deacon Jones and Delicious. Newfane is similar to the Delicious but has better color and larger size.

Another red "sport" is the Red McIntosh, which was originated by a prominent New York fruit grower, Isaac C. Rogers of Dansville. It appears to be the first red "sport" of this variety. Recent red "sports" of other varieties are Starking, Rickared, Red Baldwin, Red Spy, and Red

Gravenstein. Surely the market demand for a red apple will soon be met.

Breeding work is being carried on in Oregon, South Dakota, New York, and other places to obtain blight-resistant varieties of pears. Professor Reimers of Talent, Oregon, is well known for his valuable contributions. N. E. Hansen, horticulturist at Brookings, South Dakota, has developed several varieties of pears. Some of these are resistant to blight.

The Geneva station has recently named and introduced four varieties of pears. The newest of these varieties is Ewart, a seedling of the Bartlett type. Its fruits ripen about a month later than the Bartlett and they are of excellent size, shape, and color. It is stated that the trees are resistant to blight. The new variety was named after a fruit grower of Akron, Ohio, Mortimer Ewart, who grew the first cions and fruits.

Three new varieties of peaches have been originated in Canada. All of them are of the Elberta type, but earlier. These varieties have been named Vedette, Valiant, and Veteran. Mikado is another early Elberta type. Much effort has been expended to obtain early Elberta types.

South Haven, originated by A. G. Spencer of Kibbie, Michigan, is a Crawford type. This new peach is about two weeks earlier than the well-known Elberta. For local consumption it is considered one of the best of the recent new varieties.

Two new plums are Albion and Monitor. The former was originated at Geneva from a cross between Golden Drop and Grand Duke. It is of the Grand Duke type, but superior to that parent. The Monitor plum was originated at Excelsior, Minnesota, by the Minnesota Fruit Breeding Farm. It is the result of a cross between Burbank and a native seedling. Monitor is quite winter hardy.

Beauty and Formosa are two of Burbank's creations. These Japanese plums have met with favor for some time. Hansen of South Dakota has grown several thousand plum and cherry seedlings. He has developed numerous varieties, most of which carry Indian names. Stanley is a prune type from Geneva.

The mosaic disease is the limiting factor in raspberry production in many places. Resistance to this disease has been sought for by many breeders. Latham and Lloyd George are two of the newer varieties which have been receiving attention.

The Viking red raspberry is a new creation from Canada. It was originated by Prof. F. S. Reeves of Prince Edward Island, while he was still connected with the experimental farm at Vineland. Professor Reeves states that this variety brings a premium on the market because of its large size and color. The new variety has met with favor in the eyes of growers, pickers, and consumers. Viking shows some resistance to mosaic.

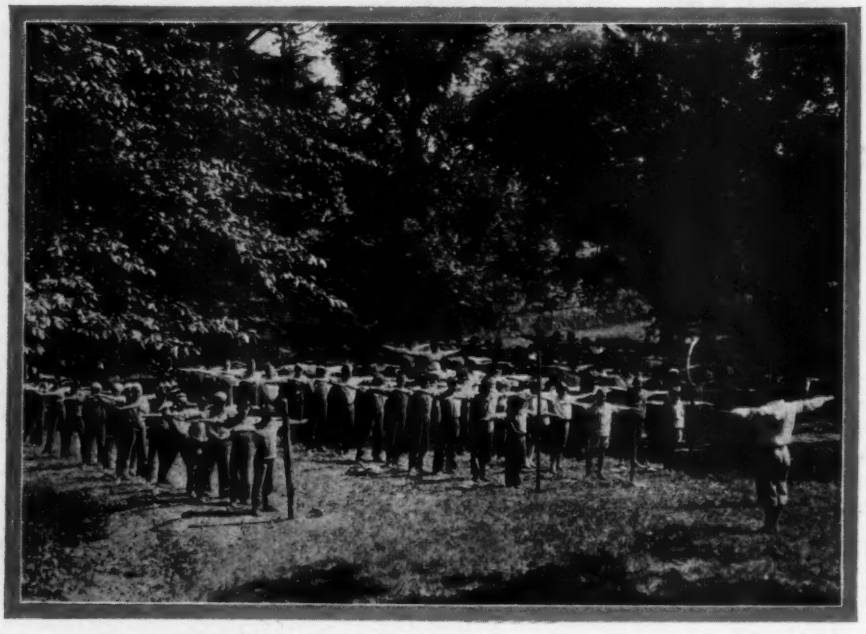
Newburgh was originated at Geneva from a cross between Newman and Herbert. It is about a week earlier than the well known Cuthbert variety. In quality and size of fruit Newburgh is outstanding. It is claimed that this variety is resistant to disease.

The Blakemore strawberry was originated by the U. S. Department of Agriculture from a cross between the Missionary and Howard 17 varieties. It is suggested for trial where these parents and the Klondike are grown, particularly in the South. This variety was named for Marcus Blakemore, first president of the National Preservers' Association. Blakemore is early and superior for both preserving and the market.

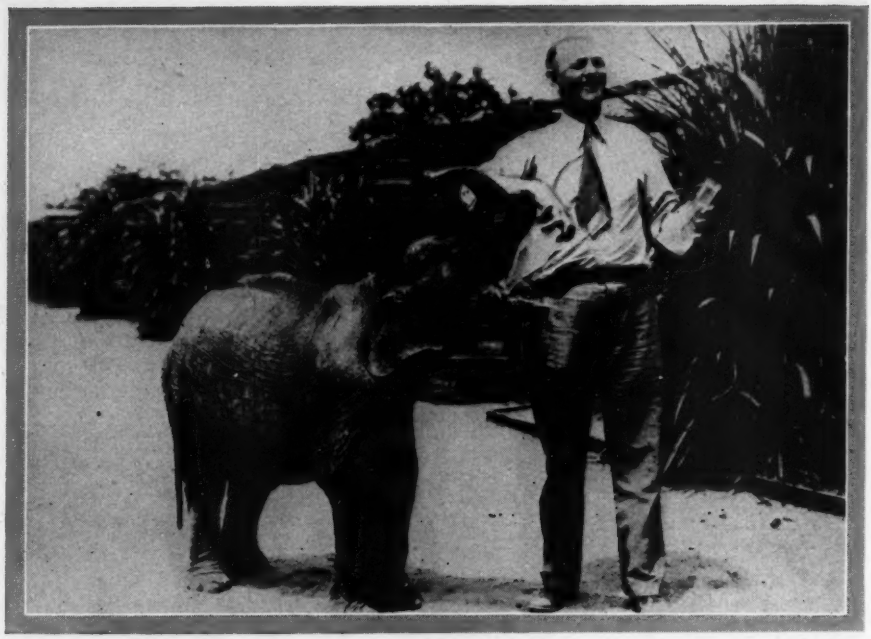
Wynona is one of the best late strawberries. It was originated as a seedling of Gandy by A. S. Johnson of Bedford, Virginia. The excellent appearance of the fruit of this variety is one of its outstanding features.

*. . . . Just at the time when he was giving her a big thrill with his new speedster. This is always a tough break but especially so when you are trying to make a hit with your best girl.*

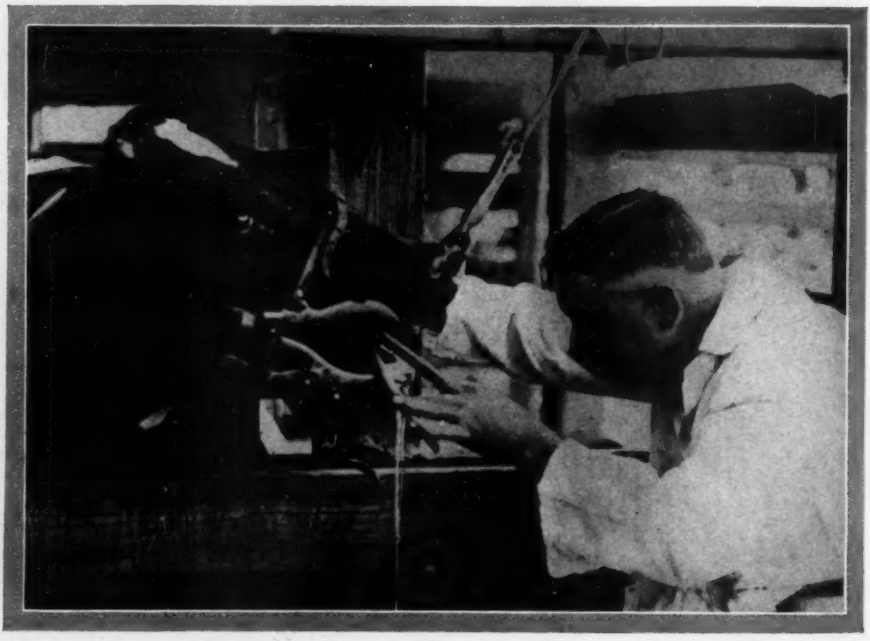
*Above: Dorothy Marshall, of Pomona, Calif., the National All-round "Farmerette" Champion, training for the National Farm Girl Championships which are held this month at the Los Angeles County Fair. Below: Boys and girls attending a 4-H Club Camp taking part of their daily calisthenics to keep fit for other activities.*



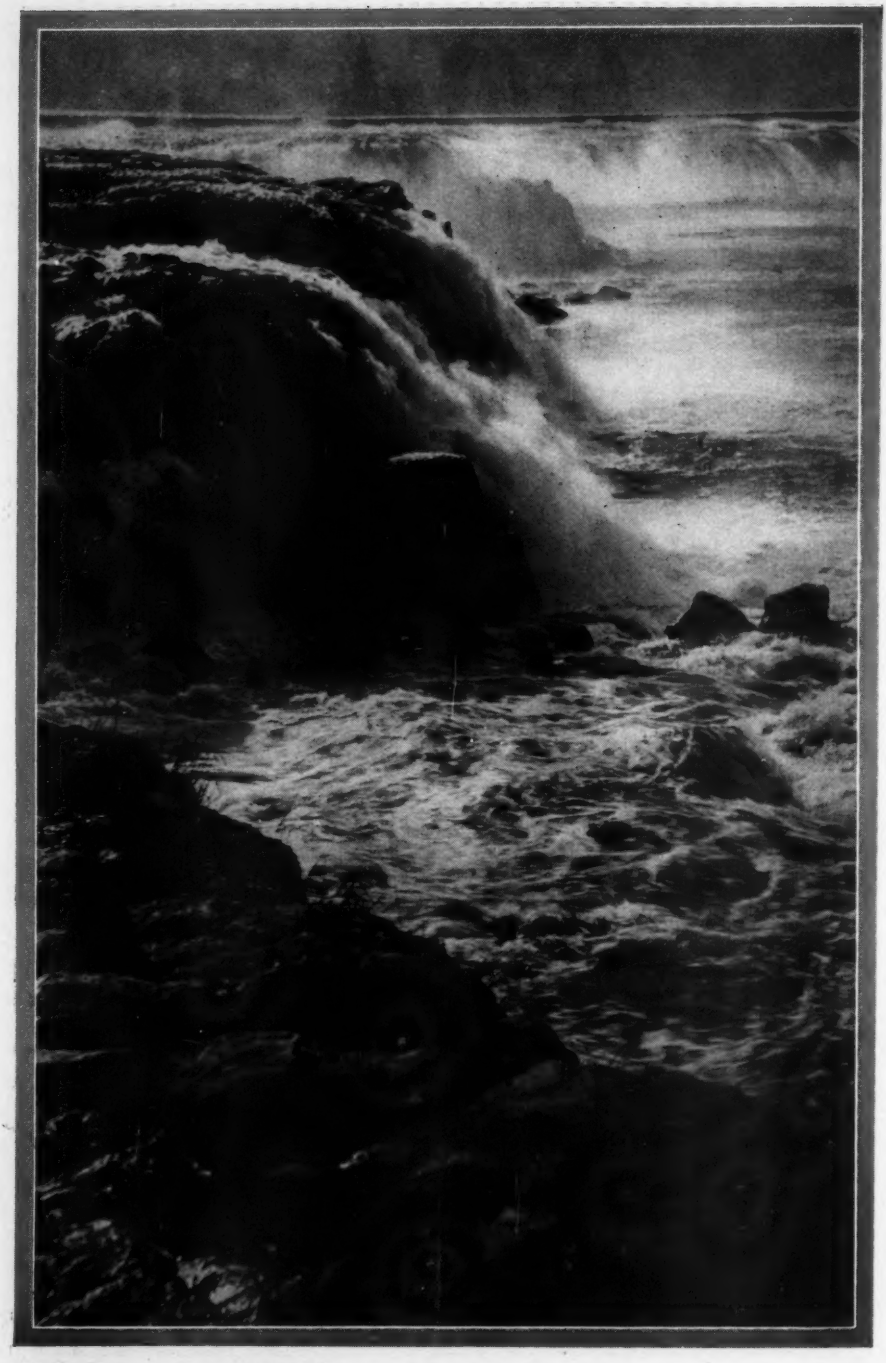
*World series material, maybe. But not this year.*



*Above: "Tinymite", of Los Angeles, Calif., whose menu consists of six quarts of milk, six heads of lettuce, seven gallons of rice, three loaves of bread, one gallon of raisins, and one gallon of bran. Below: "Open wider please!". Experiments with farm animals are helping scientists to find the cause of tooth decay.*



*Enough to inspire a poet or an artist.*



*No! You are wrong; this isn't Niagara . . . It is the Celilo Falls in the Columbia River.*

# The Editors Talk

## The Fertilizer Situation

The recent change of outstanding importance in the present fertilizer situation has been the rapid decline in crop prices, though the situation is quite variable and spotted over the country as a whole. The outlook in some parts of the country is better and in other parts of the country not so good as at this time last year.

The situation appears less favorable in the Southern States. The July 15 farm price of cotton was 11.9 cents per pound. This represents a decrease of 15 per cent from the June price and is 31 per cent below the July, 1929, price. The August 1 condition report of the United States Department of Agriculture indicates a cotton crop of 14,362,000 bales this year. This is 3.1 per cent less than the 1929 crop and 4.4 per cent less than the 1924-1928 average. North Carolina, South Carolina, and Georgia were the principal States reporting prospects of greater production than last year. Alabama, Arkansas, Louisiana, Mississippi, and Tennessee reported the largest reductions in the prospective crop compared with last year. Therefore, conditions are more unfavorable in the Mississippi Valley area where the combination of low crop prices and severe drought damage will apparently result in no returns for this year's crop.

Prices for early marketed tobacco in Georgia and South Carolina averaged about 20 per cent lower than for comparable grades last year. The condition of the crop on August 1 indicated a reduction of 2.9 per cent from last year's crop. A less than normal increase in the indicated supply of flue-cured tobacco improves the prospects for higher prices as the season advances.

In the Midwest, lower prices for wheat, slightly lower prices for corn, and severe drought damage in some areas combined to make the outlook at present somewhat less favorable than a year ago, though a certain amount of optimism prevails regarding fall fertilizer tonnage.

The outlook in the potato-growing sections of New England, New York, and New Jersey appears to be about the same as last year. Except for some areas, yields are expected to be better than the average. The July 15 farm price was 42 cents per bushel above the low price of a year ago, but approximately 10 cents below the price that prevailed throughout the remainder of the season.

Conditions on the Pacific Coast, particularly in the southern fertilizer areas, are good. A continuance of good prices is expected for citrus and other crops. Conditions in Florida are fair to good. In some sections of the Middle Atlantic States with certain crops, conditions are fairly good. In other sections conditions are poor.

The possibilities of increased prices on some crops will tend to offset the decreased prices on others. This will tend to help the purchasing power of the farmer and to favor the use of fertilizer on these particular crops in greater amounts next year. High prices of a crop usually tend to influence favorably the amount of fertilizer used on it the following year.

While crop prices have declined, conditions in certain areas, particularly

outside the Cotton Belt are such that the situation would have to be called spotted rather than uniformly bad.

Of course, the season is yet very early, prices later in the year have much more to do with the situation. There is still time for changes, and the present unfavorable indications of the fertilizer situation this year may be materially improved, especially in some sections of the country. Careful consideration and planning of the business rather than undue pessimism should be the order of the day so as to make the most of the bright spots that appear.

## The City Man and the Country Boy

A recent development of major importance in Ontario has been the linking up of farm projects with City Service Clubs, Boards of Trade, and Chambers of Commerce. Boys' Potato and Grain Clubs, Calf Clubs and Poultry Clubs have been sponsored, encouraged, and directly assisted by Rotary, Kiwanis, and other urban organizations—and with conspicuous success.

Such gestures on the part of business men toward the farmer and his boy are not at all new. There has always been a keen desire on the part of the city man to help and to advise the farmer, but failure has too often resulted from an entire lack of understanding of farm problems by the would-be benefactor and a wrong method of approach. The farmer does not care to be "advised" by those who don't "know." Therefore the reasons of the apparent success of the present undertakings might be studied thoughtfully.

Two disastrous pitfalls have been avoided. By using the County Agricultural Representative as chief counsellor and go-between, the Service Club members don't give advice. That is left for those who are not only competent to give sound advice, but who have the confidence of the boy and his father.

And next, the approach to the project has not been one of condescending tolerance—the farm boy is not considered to be in the "underprivileged" class, but on the other hand is treated as an equal. He stands side by side with the Rotarian or Kiwanian; talks over in a friendly fashion the details of the project; keeps accurate record of cost and of profits; and makes his report at the end of the year in a businesslike way. Mutual friendships spring up, goodwill and more complete understanding arise. The respect of the farm boy for his occupation increases and he is encouraged by his association with business men to improve himself and his farm practice.

Mr. W. A. Weir, Chairman of Eastern Canada Agricultural District for the Kiwanis Club, and himself a graduate of an Agricultural College, states that the "one and only objective is the development of a better understanding with the farming community." But while this has been the main purpose, the nature and design of the various projects have contributed much information of very direct benefit to the boy, his parents, and the community.

The "Downtown Kiwanis Club of Toronto" sponsored a Boys' Potato Club in Ontario county in 1929, in which 113 boys participated. Their yields were very much higher than the county average. Thirty-eight boys secured an average yield of 240 bushels per acre; ten of them within a fraction of 300 bushels; while one secured a yield of 452 bushels per acre—more than twice the average county yield. It was shown that yields could be profitably increased by the wise use of fertilizers, increased yields as high as 137 bushels

per acre being recorded as due to fertilizer alone. Comparative costs of production showed that good seed, proper cultivation and spraying, and judicious use of fertilizer all combined to give greater return for money and labor expended. Other growers in the community are taking advantage of such facts, with mutual benefit to all concerned.

In another potato growing district the Rotarian sponsors, through the medium of their boy proteges in the Club project, encouraged the boys to grade their potatoes before selling. The direct benefit from this enterprise was soon observed by the fathers and neighbors of these boys, and the idea developed to the extent that the whole output of potatoes in that area were put on the market properly graded and in attractive bags under a special brand name. "Tepee" brand now stands as an epitome of quality.

These are some of the results of Service Club activities with the country boy. The method of approach is not—how to *keep* the boy on the farm, but how to make him *want* to stay.

**Flax** Everybody should be happy to learn of a crop in which there is no over-production. W. Carl Dorr tells in another page in this issue that there is no surplus production in flax.

The crop is suited to Minnesota, North and South Dakota, Montana, parts of Iowa, and Wisconsin. There is an average flax consumption of something over 40,000,000 bushels in this country and only an average annual production of approximately 22,0000,000 bushels. The July 1 estimate of the 1930 crop was some 30,000,000 bushels.

A new tariff raised the rate on flaxseed from 40 cents to 56 cents per bushel and the rate of 3.3 cents per pound on all linseed oil imported is still effective.

The place of flax in the rotation, some hints on growing flax, the harvesting of the crop, weed control, and other factors are discussed in an interesting manner by Mr. Dorr.

**Sinners** We have heard many preachments on the importance of maintaining the fertility of our soils, but none, it seems to us, have had quite the appeal of the two paragraphs quoted below from an address delivered by Clarence Ousley, former Assistant Secretary of Agriculture of the United States, before the recent convention of the National Fertilizer Association at Denver, Colorado. We are hardly capable of selecting classics, but seemingly this should rank with Ingalls' essay on "Grass" or Vest's eulogy on "The Dog", as one of the classics that should appeal to all farmers.

"I always contemplate the earth with reverence. I like the phrase 'Mother Earth'—the source of all our sustenance, the storehouse of all our supplies, our raiment, our shelter, the pathway of our feet, the final resting place of our worn bodies. And of all its elements and attributes, the soil seems to me to be most appealing and vital, and I cannot but regard its depletion as vandalism and sacrilege. The good God gave us but one soil, and He gave it for the use of His children to the end of time. We are but His trustees in the occupancy and preservation of the estate of all posterity. If we despoil it, if we fail to maintain it, if we leave it less fruitful than we received it, we are unfaithful trustees, and I feel that in the sight of God we are as culpable as if we robbed

the estate of orphan children of whom we were made guardians by decree of court.

"Spiritual or emotional considerations aside, the first rule of all sound business enterprises is to maintain the physical plant. Allowance for depreciation and for replacing wear and tear is the first charge against profits; it cannot be spent or dissipated without inviting bankruptcy. The soil is the farmer's laboratory plant, and it must be maintained. There was a time when increasing population called for a large volume of supplies, and when the greater demand enhanced land values more than soil depletion depressed them. But we are nearer a state of equilibrium between population and supplies. We now have overproduction of nearly every product and in nearly every agricultural country. Henceforth, the first requisite of profitable agriculture is increased acre yield to reduce unit cost, and the first element of that requirement is soil fertility."

When those of us mathematically inclined begin to figure the amount of plant food removed by annual harvests, that is lost out of our soils by useless erosion, or escapes by preventable leaching, and balance this against the pitifully small amounts restored by legumes, manures and commercial fertilizers, we are bound to admit that we are recreant to the trust imposed upon us by an allwise creator of leaving our soils as good as we found them. In other words, that we have sinned and must sooner or later pay the penalty, if, indeed, we are not paying it now.

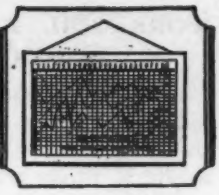
## The Capper Award

We were indeed pleased at the announcement that Dr. Stephen Moulton Babcock has been selected as the first recipient of the Capper award in agriculture. Dr. Babcock's unselfish devotion to the advancement of the industry has become a legend in agriculture. In the June issue of BETTER CROPS WITH PLANT FOOD appeared Dr. A. S. Alexander's tribute to the grand old man whose "inquiring mind and seeing eye" have done so much for the farmers of the world.

The award, which will be officially presented to Dr. Babcock in Madison, Wisconsin, at the time of the Country Life Conference October 7 to 10, comes from a fund provided by Senator Arthur Capper of Kansas. It is anticipated that the award will be granted annually "to provide a concrete expression of gratitude to some of the persons who have made contributions of national importance to agriculture and to assist in stimulating public appreciation of unusually fine service to the farming industry." In other words, to function in the field of agriculture much as the Nobel prizes do in the fields of arts, letters, and the fundamental sciences. The annual award consists of $5,000 in cash and a gold medal.

The committee on awards is made up of F. D. Farrell, President of the Kansas State Agricultural College, John H. Finley, Editor of the New York *Times,* Carl R. Gray, President of the Union Pacific Railroad, James T. Jardine, Director of the Oregon Agricultural Experiment Station, Frank O. Lowden, President of the American Country Life Association, H. A. Morgan, President of the University of Tennessee, Walter T. Swingle, Agricultural Explorer, United States Department of Agriculture, and F. B. Nichols of the Capper Press.

## AGRICULTURAL DEVELOPMENTS



# Turnips or Rutabagas?

*By E. N. Bressman*

Oregon Agricultural College

IT is surprising to find that a large number of growers are unable to distinguish between many of our common crops. I find that there was a great deal of interest in the article "Squash or Pumpkin?" in the August issue of BETTER CROPS.

Many have asked how to distinguish between turnips and rutabagas, which are common root crops fed to livestock in many sections where the nights are cool and these roots make a large tonnage.

The rutabaga has a short stem on the upper part of the fleshy root which is harvested for feed. On the other hand, the turnip has no stem on the upper part of the root. Just a simple little botanical difference is the distinction between these two crops. It is true that both of these crops are closely related and belong to the botanical group known as Brassica. The common wild mustard and nearly one hundred species of plants belong to this group. Some of them are annuals, some biennials like rutabagas and turnips, and many of them are perennial in growth.

In the field it is fairly easy to distinguish between turnips and rutabagas particularly when they are rather young. The rutabaga leaf has a waxy bloom which may be rubbed off with the fingers. This bloom gives the rutabaga a bluish or gray cast to the green color of the leaf. On the other hand, the turnip has none of this bloom but has a bright or grass green appearance.

# Chlorate Sprays

THE use of the chlorates as sprays for killing noxious weeds has spread more rapidly than almost any new agricultural contribution. This spread has been due chiefly to the favorable publicity given to this valuable method by the agricultural press.

There appears to be a difference of opinion in regard to whether or not the spray material must reach the foliage of the plant or whether it can be applied to the soil. There has been some work which shows that sprays on the ground, either liquid sprays or the chlorates as dust give good control. Recently, however, much of the work indicates that if satisfactory kills are to be obtained the spray or dust material must reach the leaves of the plant.

Spraying or dustings of noxious weeds with chlorate material up till the time the plant seeds in the fall are giving good results. In fact some trials show that sprayings late in the fall are the most desirable. At any rate fall sprayings give good results and can be practiced in cases where that time of spraying is the most feasible.—*E. N. Bressman.*

## WORK SOIL AROUND TREE ROOTS

In working the soil around the roots no air spaces should be left when the tree is finally planted. The soil should be firmly and carefully packed so that the tree cannot be shaken from its position, says the American Tree Association of Washington. The pointed stick and tamper may be used, but fingers and heel are more efficient for small trees and less liable to bruise the roots. A popular and excellent way to get the soil properly around and among the roots is to soak the soil in the excavation after the roots are covered and, after the water settles, to complete the filling in of the soil. An inch of loose soil or leaf mould should be placed about the tree to prevent the soil from baking. The Association will send anyone, for a stamp, full tree planting suggestions.

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## WISCONSIN FARM LIFE SURVEY REVEALS CHANGES

That country life in America is undergoing revolutionary changes is disclosed in a survey of some 300 Wisconsin farm families and by a close study of their interest and participation in the activities of various organizations in the local communities, according to E. L. Kirkpatrick, associate professor of rural sociology at the University of Wisconsin.

During the next decade rural America will swing more and more toward an interest in recreation, education, and the artistic side of farm life, according to Professor Kirkpatrick, who notes that the trend in farm life is toward the intangible or nonmaterial things.

In the survey it was found that farm families taking part in the activities of different local clubs and organizations, usually took a fairly large number of periodicals, had books in their home libraries, spent considerable time in reading, and listened to the radio quite often. The results of the survey indicate that if rural clubs and different community groups are to succeed in the future, they must study their place in country life carefully and base their programs on thoroughgoing study.

The American neighborhood, Professor Kirkpatrick points out, no longer holds farmers to the contacts of former days. Farm families are merging with the more complex life of all society. Their range of interests are expanding as never before. The radio, newspapers, good roads, telephone, and better transportation facilities in general are largely responsible for this break-down in the old style farm and village home.

To study these changes in detail and to see how they are related to standards of living on the farm, hundreds of country life leaders will assemble at the 13th annual meeting of the American Country Life association to be held at the University of Wisconsin, October 7-10.

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## U. W. PROFESSOR HONORED

Professor L. R. Jones of the plant pathology department of the University of Wisconsin received an honorary degree of doctor of science at Cambridge, England, from Oxford university, according to a recent announcement. Professor Jones is now attending the fifth international botanical congress at Oxford university.

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## RIGHT

Economics Professor: "Name some production in which the supply exceeds the demand."

Student: "Trouble."—*High Tension News.*

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Who says sports are harmless? Think of all the unhappy children in this country made fatherless by golf.—*Life.*

# REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, Crops, Crop Diseases, and Insects. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

## Fertilizers

An interesting and instructive general discussion of factors to be considered in the use of fertilizers is contained in Circular 317 of the California Experiment Station at Berkeley by Dr. D. R. Hoagland entitled, "Fertilizer Problems and Analysis of Soils in California." Discussing the influence of availability of soil minerals on fertilizer needs, the author points out that the kind and fineness of soil minerals, as well as the crop being grown, govern to a large extent the amount of nutrients able to be supplied by the soil and the amount needed to be added as fertilizer. Moreover, it must be kept in mind that the fertilizer materials, especially potash and phosphoric acid react in the soil. The application of a fertilizer to the surface of the soil affords no certainty that roots, especially of trees many feet below the surface, receive the nutrients. The phosphoric acid and potash may be held in the surface soil and never reach the root zone of fruit trees, thus resulting in such trees suffering from a lack of nutrients even though fertilized. Some relationships between fertilization and quality are also presented. This excellent short and clearly written circular offers much food for thought for all who are interested in the use of fertilizers, practical as well as scientific.

The increase in the use of fertilizers in Indiana is strikingly portrayed by H. R. Kraybill and co-workers in Circular 171 of the Purdue Agricultural Experiment Station entitled, "Commercial Fertilizers." In 1883, only 8,000 tons of fertilizer were sold in this state; in 1929, 291,193 tons, an increase of 36 times. The first use of appreciable quantities of complete fertilizer was in 1893, when 18,000 tons or 47 per cent of the total tonnage fell in this class; in 1929, 214,010 tons complete fertilizer were sold comprising 73 per cent of the total tonnage. Another table shows that between the years 1920 and 1929 the average pounds per ton of actual plant food in all fertilizer sold rose from 328 to 417 pounds, while the average cost per ton of plant food dropped from .114 cents to .094 cents. This shows that farmers are buying higher analysis fertilizers and are getting them cheaper per pound of plant food, even though the total average cost per ton of fertilizer has increased slightly.

The most popular fertilizer analysis from 1922 to 1924 was 0-16-0; from 1925 to 1928 a 2-12-2 analysis and in 1929, a 2-12-6 analysis. This trend in the use of nitrogen, phosphoric acid, and potash is further shown by the amounts of these individual nutrients consumed in all fertilizers.

| | *Nitrogen* | *Phosphoric Acid* | *Potash* |
|---|---|---|---|
| | Tons | Tons | Tons |
| 1920 | 1,748 | 25,129 | 3,795 |
| 1929 | 5,978 | 31,760 | 18,361 |

These figures shows a marked increase in the use of nitrogen and potash and a moderate increase in the use of phosphoric acid. This relatively faster increase in the use of nitrogen and pot-

ash is in line with the trend in many of the Mississippi and Ohio Valley States.

Standard definitions of the various fertiilzer materials, as well as usual tables of fertilizer control data are included in this circular.

*"Registration, Labeling, Inspection, and Sale of Commercial Fertilizers; 1929," Agr. Exp. Sta., Columbia, Mo.*

*"Analysis of Commercial Fertilizers," Agr. Exp. Sta., Clemson College, S. C., Bul. 267, Aug., 1930, R. N. Brackett and D. H. Henry.*

## Soils

*"The Effect of the Amount and Nature of Exchangeable Cations on the Structure of a Colloidal Clay," Agr. Exp. Sta., Columbia, Mo., Res. Bul. 129, Oct., 1929.*

*"Reconnaissance Soil Survey of Lake of the Woods County, Minnesota, U. S. Department of Agriculture, Washington, D. C., No. 8, Series, 1926, Mark Baldwin, J. Ambrose Elwell, and W. W. Strike.*

*"Soil Survey of Kossuth County, Iowa," U. S. Department of Agriculture, Washington, D. C., No. 19, Series 1925, T. H. Benton, D. S. Gray, F. R. Lesh, and J. E. McKeehen.*

*"Soil Survey of Clayton County, Iowa," U. S. Department of Agriculture, Washington, D. C., No. 20, Series 1925, T. H. Benton and A. L. Gray.*

*"The Base Exchange Property of Organic Matter in Soils," Univ. of Ariz., Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 30, June 15, 1930, W. T. McGeorge.*

## Crops

The Delaware Agricultural Experiment Station has published the results of their pasture improvement work in Bulletin No. 164 recently released. The author, George L. Schuster, has presented the four years' investigations clearly and with enough illustrations to quickly conclude which fertilizer treatment brought best results. The best grazing turf produced was on the lime, superphosphate, and muriate of potash plot. Anyone interested in pasture improvement will find this bulletin a valuable reference.

*"Maintenance of Moisture-Equilibrium and Nutrition of Plants At and Below the Wilting Percentage," Univ. of Ariz., Tucson, Ariz., Tech. Bul. 29, Mar. 15, 1930, J. F. Breazeale.*

*"The Climate of Arizona," Univ. of Ariz., Tucson, Ariz., Bul. 130, Apr. 1, 1930, H. V. Smith.*

*Monthly Bulletin of the Department of Agriculture, State of California, Sacramento, Calif., Vol. XIX, No. 6, June, 1930.*

*"Progress Report of Prune Storage and Maturity Studies," Univ. of Idaho, Moscow, Idaho, Bul. 167, August, 1929, C. C. Vincent, Leif Verner, and E. C. Blodgett.*

*"Alfalfa on the Cut-over Lands of Northern Idaho," Univ. of Idaho, Moscow, Idaho, Bul. 169, Mar., 1930, J. H. Christ.*

*"Soybean Production in Kansas," Agr. Exp. Sta., Kansas State Agr. Col., Manhattan, Kan., Bul. 249, Feb., 1930, J. W. Zahnley.*

*"A Report of the Tribune Branch Agricultural Experiment Station," Agr. Exp. Sta., Kansas State Agr. Col., Manhattan, Kan., Bul. 250 Mar., 1930, T. B. Stinson, and H. H. Laude.*

*"Abstracts of Papers Not Included in Bulletins, Finances, Meteorology, Index," Agr. Exp. Sta., Orono, Me., Bul. 353, Dec., 1929.*

*American Potato Journal, Potato Association of America, East Lansing, Mich., Vol. VII, No. 8, July, 1930.*

*"Time of Harvesting Soybeans," Univ. of Mo., Columbia, Mo., Bul. 279, Feb., 1930, R. E. Uhland.*

*"Legume Inoculation," Univ. of Mo., Columbia, Mo., Bul. 282, Mar., 1930, W. A. Albrecht.*

*"A Classification of Soybeans," Univ. of Mo., Columbia, Mo., Res. Bul. 131, Dec., 1929, W. C. Etheridge, C. A. Helm, and B. M. King.*

*"Legume Bacteria with Reference to Light and Longevity," Univ. of Mo., Columbia, Mo., Res. Bul. 132, Jan., 1930, Wm. A. Albrecht, and Lloyd M. Turk.*

*Forty-third Annual Report of the Agricultural Experiment Station of Nebraska, Univ. of Nebraska, Lincoln, Neb., Feb. 1, 1930.*

*Fortieth Annual Report, Agr. Exp. Sta. of the N. M. Col. of Agr. and Mechanic Arts, State College, N. M., 1928-1929.*

*The Bimonthly Bulletin, Ohio Agr. Exp. Sta., Wooster, Ohio, No. 145, July-Aug., 1930.*

*"Irrigated Pastures for Dairy Cattle," Agr. Exp. Sta., Ore. State Agr. Col., Corvallis, Ore., Sta. Bul. 264. May, 1930, I. R. Jones and P. M. Brandt.*

*Bul. 271, July, 1930, Dept. of Agriculture-Immigration of Virginia, G. W. Koiner, Commissioner, Richmond, Va.*

*"The Production of Cereals Under Irrigation in Washington," State Col. of Wash., Agr. Exp. Sta., Pullman, Wash., Bul. 240, June, 1930, H. P. Singleton.*

*"Lettuce Growing in Greenhouses," U. S. Dept. of Agr., Washington, D. C., Farmers' Bul. 1418, May, 1930, Revised, James H. Beattie.*

*"Growing Cucumbers for Pickling," U. S. Dept. of Agr., Washington, D. C., Farmers' Bul. 1620, Apr., 1930, J. H. Beattie.*

*"Varieties of Hard Red Spring Wheat," U. S. Dept. of Agr., Washington, D. C., Farmers' Bul. 1621, May, 1930, J. Allen Clark.*

*"Growing Black Locust Trees," U. S. Dept. of Agr., Washington, D. C., Farmers' Bul. 1628, May, 1930, Wilbur R. Mattoon.*

*"Steam Sterilization of Soil for Tobacco and Other Crops," U. S. Dept. of Agr., Washington, D. C., Farmers' Bul. 1629, May, 1930, James Johnson.*

*"The production of Hyacinth Bulbs," U. S. Dept. of Agr., Washington, D. C., Cir. 112, Apr., 1930, David Griffiths.*

*"Timber Growing and Logging Practice in the Northeast," U. S. Dept. of Agr., Washington, D. C., Tech. Bul. 166, Mar., 1930, Samuel T. Dana and William B. Greeley.*

*"Breeding Tobacco for Resistance to Thielavia Root Rot," U. S. Dept. of Agr., Washington, D. C., Tech. Bul. 175, Mar., 1930, James Johnson.*

*"Agricultural Education—Organization and Administration," Federal Board for Vocational Education, Washington, D. C., Bul. 13, Agr. Series No. 1, Rev. edition, May, 1930.*

*"Analysis of the Management of a Farm Business," Federal Board for Vocational Education, Washington, D. C., Bul. 88, Agr. Series No. 16, Revised June, 1930.*

*"Analysis of the Management of a Corn-growing Enterprise," Federal Board for Vocational Education, Washington, D. C., Bul. 101, Agr. Series, No. 24, Revised June, 1930.*

*"Methods of Teaching as Applied to Vocational Education in Agriculture," Federal Board for Vocational Education, Washington, D. C., Bul. 103, Agr. Series, No. 25, Revised April, 1930.*

*"Supervised Practice in Agriculture Including Home Projects," Federal Board for Vocational Education, Washington, D. C., Bul. 112, Agr. Series, No. 29, Revised Edition Apr., 1930.*

## Diseases

*"Researches on Potato-Virus Diseases in Montana," Univ. of Mont., Agr. Exp. Sta., Bozeman, Mont., Bul. 231, June, 1930, P. A. Young and H. E. Morris.*

*"The Symptoms of Spindle Tuber and Unmottled Curly Dwarf of the Potato," Univ. of Neb., Lincoln, Neb., Res. Bul. 47, May, 1930, R. W. Goss.*

*"The Bacterial Diseases of the Bean," Cornell Univ., Agr. Exp. Sta., Ithaca, N. Y., Memoir 127, Apr., 1930, Walter H. Burkholder.*

*"A Chemical Control of Sweet Potato Scurf," N. C. State Col. of Agr. and Engineering, State College Sta., Raleigh, N. C., Tech. Bul. 38, May, 1930, R. F. Poole.*

*"Raspberry Disease Control," Pa. State Col., State Col., Pa., Cir. 133, June, 1930, George L. Zundel.*

*"Chlorosis—Yellowing of Plants," Agr. Exp. Sta., Utah State Agr. Col., Logan, Utah, Cir. 85, May, 1930, F. B. Wann.*

## Insects

*"Surface Tension, Surface Activity, and Wetting Ability as Factors in the Performance of Contact Insecticides," N. H. Agr. Exp. Sta., N. H., Tech. Bul. 39, Feb., 1930, W. C. O'Kane, W. A. Westgate, L. C. Glover, and P. R. Lowry.*

*"The Bean Leaf Beetle," S. C. Agr. Exp. Sta. of Clemson Agr. Col., Clemson Col., S. C., Bul. 265, May, 1930, C. O. Eddy and W. C. Nettles.*

*"The Rice Weevil and Associated Insects in Relation to Shuck Lengths and Corn Varieties," S. C. Agr. Exp. Sta. of Clemson Agr. Col., Clemson Col., S. C., Bul. 266, June, 1930, O. L. Cartwright.*

*"Notes on Miscellaneous Insects of Utah," Agr. Exp. Sta., Utah State Agr. Col., Logan, Utah, Bul. 216, April, 1930, Herbert J. Pack (Compiled by George F. Knowlton).*

## Economics

The importance of fluctuations in agricultural production as a cause of business cycles in this country is demonstrated in a study published recently by the University of Michigan entitled, "The Rôle of Agricultural Fluctuations in the Business Cycle." This study by Dr. V. P. Timoshenko does not pretend to explain business cycles by the single factor of fluctuations in agricultural production alone, but rather to show the importance of agricultural fluctuation in initiating business cycles.

Cycles of varying length and amplitude are shown to exist in agricultural production and in the ratio of agricultural to industrial prices. It is found that a low ratio of agricultural to industrial prices generally precedes or coincides with a business revival, while a high ratio often precedes or coincides with business recessions. Large crops do not regularly increase the purchasing power of farmers, but they do generally increase the purchasing power of railroads and of dealers in agricultural products. Large crops also tend to result in large volume and high value of agricultural exports which brings purchasing

power from abroad in monetary form and acts as a stimulus to business activity.

*"Credit Problems of North Carolina Cropper Farmers," N. C. Agr. Exp. Sta., State College Station, Raleigh, N. C., Bul. 271, May, 1930, H. H. Wooten.*

*"Factors Relating to the Price of Idaho Potatoes," Dept. of Agr. Economics, Univ. of Idaho, Moscow, Idaho, Bul. 166, June, 1929, R. B. Heflebower.*

*"Farm Land Values in Kansas," Agr. Exp. Sta., Kansas State Agr. Coll., Manhattan, Kan., Cir. 156, Jan., 1930, Harold Howe.*

*"Types of Farming in Nebraska," Neb. Coll. of Agr., Lincoln, Neb., Bul. 244, May, 1930, Harold Hedges and F. F. Elliott.*

*"Variations in Crop Production Costs in Medina County, Ohio," Ohio Agr. Exp. Sta., Wooster, Ohio, Bul. 453, June, 1930, F. L. Morison.*

*"The Market Situation and Outlook for the Oregon Canned Fresh Prune," Oregon Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 263, May, 1930, Milton N. Nelson and W. H. Belden.*

*"Cost and Efficiency in Pear Production in the Rogue River Valley," Oregon Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 267, June, 1930, Ralph S. Besse, W. S. Brown, and L. P. Wilcox.*

*"Land Utilization and Farm Management in Wyoming County," Pa. State College, State College, Pa., Bul. 257, May, 1930, P. I. Wrigley.*

*"Cost Reduction in Dry-farming in Utah," Utah State Agr. Coll., Logan, Utah, Bul. 215, Mar., 1930, P. V. Cardon.*

*"Economic Aspects of the Washington Fruit Industry," Wash. Agr. Exp. Sta., Pullman, Wash., Bul. 238, April, 1930, Neil W. Johnson.*

*"Economic Aspects of Apple Production in Washington," Wash. Agr. Exp. Sta., Pullman, Wash., Bul. 239, April, 1930, Neil W. Johnson.*

*"Analysis of the Management of a Cotton-growing Enterprise," Federal Board for Vocational Education, Washington, D. C., Bul. 105, Agr. Series No. 26, Revised June, 1930.*

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# Tornadoes

(*From page* 32)

December, 2.6; and October, 2.9, are the months of lowest frequency. The year 1928 was a great tornado year. The Weather Bureau recorded 203 in that year. In 1919 there were only 65. During the period, 1916 to 1928 inclusive, the United States was visited by 1,481 recorded tornadoes. The average number per year for the period is 113.9.

Says Mr. Day:

"The chief concern is the fact that tornadoes will occur in the future. Moreover, their destructive effects will continually be augmented, not by increased severity of the storms, but as a result of the growing population and the building of larger factories, schools, or other places where people congregate."

The Weather Bureau's study indicates that the largest loss of life and property from tornadoes usually occur when a storm passes over a city or a number of thickly inhabited areas. On June 28, in 1924, such a storm caused great damage in and near Lorain, Ohio, resulting in a loss of nearly 100 lives and property damage amounting to about $12,000,000. In 1925, on March 18, a tornado of unusual length and severity passed from southeastern Missouri, across Illinois, and into Indiana, (more than 200 miles), and left 689 persons dead and a property damage of more than $16,000,000 in its wake. In 1927, on September 29, a $25,000,000 tornado caused the death of 79 persons at and near St. Louis, Missouri. Aggregate property losses from tornadoes were more than $43,000,000 in 1927—more than $26,000,000 in 1924—and more than $24,000,000 in 1925. Other years show varying losses in lives and property.

These freak storms have strange physical effects. Instances are on record where tornadoes have lifted heavy iron beams, offering little resistance to

"Ah's got to go to school."

the wind, and carried them considerable distances. In one case, two iron-frame cultivators standing side by side in a field were picked up and carried some distance and dropped. One was torn apart. The other was dropped unharmed. One temperamental wind picked up a nest with an egg in it, carried it away with the wreckage of a barn, and dropped the nest and egg unbroken. Another wind carried a child some distance and dropped it uninjured—but a horse nearby was mangled. A man was alone in his house at night. He noticed that a door opened strangely. He went to investigate—stepped outside the door—and dropped a considerable distance to the ground.

In the hope of securing valuable safety-first and life-saving pointers, specialists studied the storm path of one of the most destructive tornadoes of recent years, that of March 18, 1925. This storm passed for more than 200 miles in a nearly straight line from near Annapolis, Missouri, across Illinois, and disappeared in Pike county, Indiana. They discovered that steel and reinforced concrete buildings withstood the force of the winds without much damage. It was hard to say, in all cases, however, whether or not the buildings had been directly in the path of the strongest wind. It appeared also that frame structures strongly braced with sheathing offered a lot of resistance to the wind. All brick buildings as well as ordinary frame buildings, in the direct path of the storm, suffered greatly.

### *Tornado-proof Structures*

Mr. Day says that it seems possible to build structures that will stand the force of tornadoes. But whether the chance of a certain area being hit by a tornado is great enough to justify the increased cost of building is up to the builder to decide. Mr. Day feels that schools and other public buildings, as well as factories and other buildings where many people gather, should be built with a view to tornado resistance.

Tornadoes usually move from west to east. That being the case, Mr. Day says that one's first thought, in case of a threatened tornado, should

be to get out of the way, traveling at right angles to the storm. A position on the north side of the storm's track is safer than one an equal distance to the south.

The storm cellar is a classical retreat in danger in the tornado country. But in the absence of a storm cellar, one may run to the basement or cellar of a frame house. It is best to choose the side from which the storm is approaching, especially the southwest corner, close to the wall, where, if the house moves or breaks apart, the debris will ordinarily be carried away from the position.

In a brick house, however, the walls may fall in and the cellar prove a death trap instead of a refuge. If there is no protection below the ground level, it is best to find some hollow or depression in the ground and lie flat, face down, and hold to anything handy.

In schools of one story, Mr. Day recommends strongly fastening the desks to the floor. In such cases, they will offer quickly available refuges to the pupils in case of tornado, and under which the students may crouch, thus greatly lessening the danger of death or injury.

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# Boost Corn Yields

(*From page* 17)

Pierce county soils. Next year, says Mr. Seyforth, we plan to run demonstrations with fertilizers producing the best results this year only using different amounts.

We will also conduct demonstrations on corn in other sections of the county where the soil is of a different type. In addition to test plots for corn, we are conducting fertilizer demonstrations on grain and pasture improvement. The time will come when the fertilization of all pastures in the county will undoubtedly be a common practice.

Already applications of fertilizers on old pastures have been found in some instances to be responsible for a 400 per cent increase in yields.

A scene at the Mississippi Experiment Station.

# No Flax Surplus

(*From page 27*)

spring wheat seems to be a method favored by many farmers in southern Minnesota. Weeds, especially lamb's quarter and wild buckwheat, are almost completely eliminated by this method. Professor Hughes believes that this method of raising flax will become more popular in northern Iowa. The mixture rate recommended by the Minnesota Station after much experimentation is that of 42 pounds flax and 45 pounds of spring wheat per acre. This mixture should be mixed thoroughly in the granary before planting.

Careful experiments have shown that, despite the ideas of some, flax is no harder on the land than wheat or oats as far as the removal of plant nutrients from the soil is concerned. Spring wheat and oat crops remove slightly more phosphoric acid and considerably more potash than the flax crop. Flax, on the other hand, takes about four more pounds of nitrogen per acre.

The harvesting of flax may be carried on like that of oats either with a binder or a combine. If it is bound, it may be threshed by the ordinary threshing machine. Last year approximately 80,000 tons of flax straw were used in the manufacture of insulating material, tow for upholstering, and coarse wrapping cord. The length of the straw determines the grade to a great extent—10 inches in length will usually grade 1 if dry and under 5 per cent of chaff—6 inches long to grade 2, the price ranging around $11 down last year. In Iowa a company in Des Moines guarantees $1.89 per bushel for the seed plus more if the Minneapolis price justifies. It is also graded on oil content. The farther south flaxseed is grown the lower the oil content usually.

Many farmers plant wheat and oats on the better land and plant flax later on poorer land. Authorities maintain that flax will show up proportionately better as the soil fertility increases. Weed control seems to be the main problem to overcome in Iowa. By following corn or legumes, or being planted with spring wheat, flax may have a better advantage, and especially so if the soil is plowed in the spring and then harrowed consistently and packed down.

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# Tons of Asparagus

(*From page 26*)

Seed development and root development are associated with phosphorus. The production of sugars by asparagus plants is speeded up when there is plenty of potash in the soil. Of the three elements in a complete fertilizer, nitrogen is most important. Potash is next in value, and phosphorus is in last place although very necessary.

These sugars manufactured by the asparagus plant are stored up in the roots during the period immediately after the end of the cutting season and the killing of the foliage by frost that fall. When plenty of potash salts, supplied either in the muriate or the sulphate form, are present in the soil and the foliage growth is normal, this sugar storage goes on rapidly. The proteins manufactured during the same time, under conditions of available nitrogen salts in the soil and normal foliage growth, are also stored in the roots. It is from this stored-up supply of sugars, made possible through the use of potash salts, and

from the stored-up supply of proteins, made possible through the use of nitrogen carrying salts, that the early spring supply of spears or "grass" is produced. The roots in which these sugars and proteins are stored are made possible through the utilization by the plant of the element phosphorus.

The best time to apply nitrogen salts under normal conditions is about one week before the end of the cutting season. Everything possible needs to be done to aid the growth of the foliage after the cutting season and under no condition is it ever practical to remove the tops before they are completely dead. For 30 years Mr. Rogers has removed the dead top growth and burned it. He feels that there is very little value left in it. The only use the foliage is to the Rogers' asparagus patch is that of storing sugars and proteins in the roots. His observation is backed up by the work of many successful growers. The presence of tops in the surface soil makes it difficult to cultivate asparagus, and in a planting which produces as vigorous a top growth as this one, it would be difficult to work them in anyway. During the winter they are raked up and burned.

If growing conditions are not normal and if the grower feels that the supply of proteins stored up in the roots is less than normal, it might pay to give the planting a top-dressing of nitrogen-carrying salts about a week before the cutting season is expected to start. Since this is a more or less new feature connected with the fertilization of asparagus, it might be well to test it out on a part of the bed the first time.

### *200 Pounds of Potash*

In this same chemical report Rogers found that an acre of asparagus removed annually about 200 pounds of potash, 160 pounds of nitrogen, and 80 pounds of phosphorus. This fact, together with the knowledge that nitrogen-carrying fertilizers are either used by the plant roots, leached out in the drainage water, or escape into the air in the form of a gas and that the other two main elements are retained by the soil until used by the plant roots, will enable the grower to formulate his own fertilizer program. Phosphorus and potash do not work up or down very readily in the soil and so it is well to attempt at least to place these salts as near to the root system as is possible.

Mr. Rogers applies the same investigating type of mind to the control of weeds. Weed control is just another name for cultivation to this successful grower. In observing over a period of 30 years, Mr. Rogers has come to the conclusion that a young weed is easily killed if even slightly disturbed while it is still very young. So early in the spring, the spring tooth harrow is run over the acre, and in more recent years the weeder has been used to control the weeds. Since shallow workings will do the job and since deep workings as with a disc type of harrow might injure the crowns, Mr. Rogers has selected the light, shallow, level method of cultivation.

Perhaps the long and profitable life of this acre of asparagus lies in the fact that at no time has the cutting season ever been extended to a point which might result in a killing of the weaker roots. Care is used in cutting the "grass." Injury to buds and growing spears not yet above the surface is prevented by slipping the knife down parallel to the shoot and then using a twisting motion to complete the job. Recently the "grass" has been broken off by grasping the shoots near the ground and giving them a quick sidewise jerk. This recent development has the advantage of allowing the puller to carry the basket without setting it down every time a spear is harvested.

A special effort is made to harvest and deliver the asparagus to the local market the same day. Rogers has found that asparagus held over from

one day to the next becomes bitter and hence much less desirable. He has found that people eat more of the fresh product and that the repeat orders are more plentiful as a result.

For many years he wondered what caused certain spears to grow crooked. He noted that this condition was usually worse early in the cutting season. Objects in the soil through which the "grass" could not grow caused certain of them to develop abnormally. The greater abundance of the crooked spears during the early season could not be accounted for in this way. Rogers thought that the temperature of the surface soil might be responsible for this condition. He was correct. When the temperature drops to near the freezing point during the cutting season, there are usually a good many crooked spears produced.

Tons of asparagus can be produced on an acre of soil over a given number of years, but only when the requirements of the crop are met. As with other intensive crops it pays well to use correct handling methods on asparagus. Proper fertilization, liming, cultural methods, and harvesting systems are especially valuable.

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# Moisture

(*From page* 24)

| Depth, Feet | June 1910 | June 1911 | April 1912 | November 1912 | April 1913 |
|---|---|---|---|---|---|
| 1 | 8.5% | 8.5% | 21.0% | 11.6% | 21.6% |
| 2 | 8.2 | 8.5 | 15.0 | 8.7 | 17.3 |
| 3 | 8.2 | 8.4 | 8.4 | 8.2 | 16.5 |
| 4 | 8.0 | 8.7 | 8.4 | 8.1 | 9.1 |
| a | a | a | a | a | a |
| 9 | 8.9 | 9.1 | 10.1 | 9.4 | 9.7 |
| 10 | 10.6 | 9.7 | 13.7 | 11.6 | 14.1 |
| 11 | 10.3 | 9.8 | 12.2 | 11.3 | 12.3 |
| 12 | 10.8 | 9.6 | 12.7 | 10.1 | 12.1 |
| 13 | 10.8 | 15.0 | 15.7 | 11.2 | 16.9 |
| 14 | 12.8 | 17.2 | 21.3 | 14.4 | 22.2 |
| 15 | 21.0 | 21.0 | 24.8 | 20.5 | 27.6 |

a—Samples 5 to 8 feet practically uniform throughout the period at from 8 to 9 per cent.

at most be of no practical benefit to an annual crop."

Add water to a body of uniform soil, says one authority, and allow it to percolate downward through the soil mass. A condition of distribution will be reached at which the moisture content at any depth will be approximately the same except in the lower five or six inches of wetted soil. Here there will be rapid decrease in the moisture content.

Conclusions reached from studies in dry-land regions are that the roots of plants in semi-arid regions go to the stored water in the subsoil. Water is not elevated to the surface by capillarity.

Comparatively little water which has once passed below the first foot is lost by evaporation.

The significance of subsoil moisture in alfalfa growing was made clear in a report that alfalfa grows well for four to five years when first seeded on certain Nebraska soils. Then yields

rapidly decline due to the depletion of available subsoil moisture. "The alfalfa drew upon the subsoil moisture to a depth of 33 feet in a 6-year-old meadow and 25 feet in a 2-year-old meadow. After once having the subsoil moisture exhausted, it is replaced very slowly under ordinary cropping. During 15 years of cropping after alfalfa, but little water had entered the soil below 7 feet. After six years cropping to alfalfa, it would require 225 years under crop rotation to restore the subsoil moisture."

### *A Summary*

As a summary, Professors Hughes and Henson add to their compilation the results of study by H. L. Shantz on distribution of moisture:

"In arid and semi-arid regions, soil moisture has been the subject of extended investigation. In such regions moisture is the chief limiting factor and the plant growth exhausts the total available moisture almost every season. Following a rain, the surface soil becomes moist. If the soil we may consider would have a moisture equivalent of 20 per cent and a weight of say 84 pounds per cubic foot, a rainfall of 2 inches would wet it only 9 inches, if it were entirely dry. But under field conditions it would probably contain 10 per cent when dry to the plant and a rain of 2 inches would moisten about 18 inches, if none were lost by run-off. This soil would contain about 21 per cent water. This 18-inch blanket of moist soil would remain permanently dry. By dry here is meant a soil with 7 to 10 per cent moisture, depending somewhat on the condition under which the moisture was reduced. In other words, no moisture can be added to this soil to make it less than about 21 per cent, and under field conditions, not much more than about 21 per cent can be added.

"Above a water table, moisture rises in the soil to form the capillary fringe. In the soil considered, the top of the fringe might have about 21 per cent water, and this would increase until just above the water table the water content might be 52 per cent, while just below the water table all pore space would be filled with water.

"We know pretty clearly what the conditions are and the upper and lower limits of moisture content in a region where the surface is temporarily moist, the subsoil down and the capillary fringe permanently dry, and the water table at a permanent level, or in other words, the moisture condition when the rainfall is not sufficient to moisten the soil below the reach of the plant roots. But most of the agricultural production takes place under very different conditions when the amount of rainfall is in excess of the field carrying capacity of the first few feet of soil and where moisture passes through the subsoil to the water table below, in other words, where the whole soil mass is leached and where the water is available throughout the whole depth of the soil.

"The conditions here are not well known, but there seems little reason to suppose that the field carrying capacity in the root zone should be higher when the subsoil is moist than when the subsoil is dry, provided the water table in the former case lies so far below that the top of the capillary fringe does not reach the root zone. The moisture content at the surface of the soil here considered should be about 21 per cent, and as we pass down remain about the same until the top of the capillary fringe is reached, unless there should be perched water tables. If the moisture in the surface soil is evaporated or absorbed by plants, there should be no movement upward to take its place. In fact, the whole mass of soil moisture should remain stationary until water is again added above, when it would move down until the moisture content had fallen to the field carrying capacity. This is probably the condition in most of the crop areas of the U. S."

# Pasture Top-dressing

(*From page* 30)

fully as much as lack of phosphorus.

On pastures where only a moderate increase in pasture is needed the use of lime, phosphorus, and potash will give desired results. However, this mineral treatment does not give results as early in the season as the complete fertilizer. By applying complete fertilizer such as the 6-8-6 on the pasture early in April, the pasture is in shape to turn into from 10 to 14 days earlier than unfertilized pasture. The dairy farmer who is short of hay and silage in the spring will find that this early grazing will completely pay for the entire cost of the fertilizer when pasture is credited with the value of the barn feeding it replaces.

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# The Inquiring Mind

(*From page* 22)

Following the self-raking reaper came the Marsh harvester which carried the cut grain on a canvas belt to a platform on which two men stood at side tables on which they bound it into sheaves. I well remember binding with another man, 22 acres of light oats on such a machine out in Iowa in 1882 and it was a hard job. One's thighs were bruised black-and-blue against the jolting binding table, and I remember that by night the straw became so brittle that it could not be used for bands.

The manufacture of Marsh harvesters was undertaken by Mr. Gannon, of Chicago, and in 1870 he took into partnership the famous pioneer William Deering, founder of the Deering Harvester Company, to whom a large share of credit belongs for producing a practical twine binder. Later the Deering Company merged with the International Harvester Company.

Until 1878-9 self-binders that tied sheaves with wire were in vogue, but wire proved objectionable. In 1878 John F. Appleby solved the problem of binding sheaves with twine, and with his partners, Charles H. Parker and Gustavus Stone, at Beloit, Wisconsin, built and sold the first twine binder and shipped it to Travis county, Texas. Later they made 115 twine binders and in 1879 Gannon and Deering began manufacturing such binders under a license from Appleby's firm. In 1881-2 the McCormicks followed, having bought a right to make the machines. For years Appleby was associated with Deering, who capitalized the production and after many trials and vicissitudes perfected a twine binder that was a success and quickly became popular.

From the time McCormick began building twine binders "all manufacturers have been making harvesting machines of practically the same type of construction, which includes the McCormick reciprocating knife and the Appleby binding attachment on the Marsh type of harvester.

### *Late Developments*

The latest developments in this line are the harvester-thresher, the new McCormick Deering windrow harvester, and the pick-up device designed for use with the harvester-thresher which promises to bring about a greatly increased use of that machine.

According to its manufacturers, the windrow method of harvesting is especially advantageous where grain is weedy or ripens unevenly or the weather is unfavorable. The windrow

harvester is similar in design to a right-hand header. It deposits the grain, from about the center of the cutter bar, on top of the stubble, in a continuous windrow. The stubble is cut high so that it holds the cut grain and allows air to circulate underneath and thus quickly cure the unripened grain and dry out any weeds that are present. After two to four days of good drying weather, a harvester-thresher equipped with a pick-up device is brought into the field and run in the same direction as the windrow harvester. Frequently a farmer begins his harvest by windrowing his grain, and then later, when conditions are right, removes the pick-up device, from the harvester-thresher, replaces the reel thereon, and then cuts his grain and threshes it in the low-cost "once over and it's all over" fashion.

And so, step by step, with the brain power, will, and perseverance of many eminent men, reapers have been perfected to cut, bind, and thresh grain. The sickle, scythe, and cradle, and loose-sheaf depositing machines have gone into the discard, and toil has been materially lessened. The farmers of the world therefore owe much to the research men of the inquiring mind and seeing eye who have lightened the work of harvest, and are happy and ready to bestow the credit where it belongs.

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# Make Wheat Pay!

(*From page* 15)

plication of 400 pounds of 2-12-12 in the fall and a spring dressing of 100 pounds per acre of nitrate of soda in April have increased the yield to 18 bushels per acre. The increases in corn, soybean, and clover crops have paid a large share of the heavy fertilizer cost and a return of about $2.00 for each dollar invested for fertilizer has resulted. This is on droughty, sandy soil. The dark colored sandy soils of the northern portion also need the extra proportion of potash for best results.

On the sandy and sandy loam soils both in northern and southern Indiana, 100 pounds per acre applications of nitrate of soda, sulphate of ammonia, and various synthetic nitrogen carrying materials have been producing increased yields of wheat of 5 to 8 bushels per acre during the past four years. The materials have been broadcast when the wheat was from 3 to 4 inches high and have given better results than the same applications applied later.

Fertilizer drilled with wheat should not be considered for the wheat crop alone, but also for its benefit to the clover and other crops that follow. Clover failures are often prevented by the wheat fertilizer. The wheat crop itself gives a consistent response to adequate fertilization and in years when winter-killing is severe the crop is sometimes saved from almost total failure by such treatment. With lower prices for nitrogen, complete fertilizer costs are tending downward so that it is justifying its use on most of our wheat soils. The 2-12-6 is the most popular wheat formula in the state and it deserves its popularity. Where used liberally the 3-18-9 and 4-24-12 analyses are good. When the crop has come through the winter with a good stand 100-pound applications of some nitrogen carrier may be broadcast in April with the assurance that increases of 5 to 8 bushels per acre will result.

Whatever may be said for reduction in wheat production there is no justification for reducing the yield per acre. Intelligent fertilization, combined with other good wheat growing practices will help keep acre yields of the Midwest up to a profitable level.

# Peppermint

(*From page* 13)

side delivery rakes, and hay loaders are often seen in the mint fields to get the mint hay to the distillery in good condition and with the least labor.

### *A Simple Process*

The process of distillation is simple though the cost of a plant on some of the large mint farms represents a big investment. A large boiler is set in a brick furnace to provide large quantities of steam with little fuel cost. Two steam pumps are used, one to pump cold water from well over a condensing coil and one to pump hot water into the boiler as it comes from the condensing coils. Two or four tubs, eight feet deep and six feet in diameter provided with tight lids, are used to hold the hay during distillation.

A steam hoist is used to fill the tubs with hay for distillation and to empty them after the oil has been extracted. The whole plant is covered with a tight roof to protect it from the weather. On other farms the equipment is smaller and set out in the open. The hay is pitched into tubs. A team or tractor often provides the power to operate a hay fork for emptying the tubs.

After a tub is filled with the cured mint hay from the field, the lid is clamped down tight enough to hold from 40 to 75 pounds steam pressure. Live steam, turned into the bottom of the tub, passes through the hay and out the top of the tub, thence through the condensing coil to the receiving can. The hot steam as it comes from the tub carries the mint oil over with it. The oil is collected by condensing the steam in the coil before it reaches the receiving can.

In the can the oil and water quickly separate. The oil collects on top of the water and the excess water is drawn off from the bottom of the can by means of an overflow pipe which controls the height of the liquids in the can. After several pounds of oil collect on top of the water in the can, the overflow pipe is closed. This raises the water and forces the oil through an outlet in the top of the can into a container. The peppermint oil is then placed in large steel drums for safe shipment to market.

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# Rebuilt Soils

(*From page* 7)

corn belt farmers are rapidly getting fertilizer-conscious is evidenced by the growth of fertilizer distributor sales. A dealer at Bloomington, Illinois, told me that he sold 50 corn planter fertilizer attachments this spring which was double his prior year's sales.

This is an encouraging situation, for in a survey of the cost of producing corn recently made by the agricultural department of one of the corn belt states, it was found that farmers who obtained yields of 120 bushels to the acre grew the crop at the low cost of 22c per bushel. On the other hand, a class of farmers who harvested only 60 bushels to the acre expended 38c a bushel to produce the crop. In an analysis of the methods

employed by those who had the low and high cost of production respectively, it was found that the soil treatment was largely the governing factor. Eighty per cent of those who grew their corn for 22c a bushel preceded the crop with a legume, while only 60 per cent of those whose bushel cost was 38c planted the crop on a legume sod. Again, those who harvested 120 bushels to the acre plowed their land 7.6 inches deep, while the 60 bushel farmers plowed only 6.9 inches deep.

It is safe to predict that as farmers increase their annual investments in commercial fertilizer, the prosperity of the nation will mount proportionately. At present, farmers spend $108.00 a year for gasoline and oil and only a tenth as much for fertilizer per capita.

When the story of how Hilgers of Wisconsin used fertilizer to make his acres carry twice as many dairy cows is such a common experience that it no longer is news; when land holding companies duplicate the practice of Strickler of Iowa, who makes money building worn farms into highly productive acres; and when those who would farm discover how George of Nebraska made fertilizer pay for his truck farm, the phrase "Agricultural Depression" will be only a memory of an age in the evolution of this nation when we had the tools (plant foods) but had not yet learned to use them.

# $100 per Acre

(*From page* 10)

per ton, and the 0-21-9 fertilizer at $44.00 per ton, the costs of each treatment per acre would be as follows:

| | |
|---|---|
| 3 tons lime delivered at Armstrong at $1.75 per ton | $ 5.25 |
| 3 tons lime hauled and spread at $1.00 per ton | 3.00 |
| 200 lbs. of 2-12-2 fertilizer at $33.00 per ton | 3.33 |
| 125 lbs. of 0-21-9 fertilizer at $44.00 per ton | 2.75 |
| Total | $14.33 |

Deducting $14.33, the total cost per acre of the soil treatments, from $100.00, the value of the yield from the five cuttings the past two years, one still has a nice return of $85.67 per acre. In addition to this, Mr. Alexander still has a good stand of alfalfa which, if seasons are anything like normal and it is properly fed with fertilizer high in phosporus and potash, should continue to produce at the rate of around 3 tons per acre each year for at least the next five or six years.

# This County Agent Job

(*From page* 9)

miles away has found about them. The demonstration type of county agent will give the inquirer the results of last year's demonstrations and suggest the questioner visit the nearest farmer who grew the crop as a demonstration.

In the first named type of extension large numbers of people are brought together to watch hens culled, on the assumption that many or most of them will go home and cull their own flocks. On the demonstration plan, farmers at strategic points over the county are aided in making their

flocks pay maximum profits, and when neighborhood culling is done, the meeting is held at the farm of the demonstrator. Culling features the program, but the demonstrator explains all the changes he has made in his flock, management, and gives his records for the benefit of the rest.

The two types of extension have much in common. Contests, rallies, tours, school-house meetings, fair exhibits, etc. may be spotted in every nook in rural America. The demonstration type county agent gives much advice, too, but he doesn't place the faith in that method of improving matters that his brother of opposite faith does, and certainly he doesn't make it the bed-rock of his work. Both agents write news stories, the one telling farmers what and how to do, the other what and how farmers have done. Both are high-minded and earnest individuals who believe the millenium is just around the corner.

Some of these characterizations will be stoutly denied in part by both sides. In reducing the situation to simple terms, minor factors have been ignored to bring the underlying philosophies into sharp relief. True it is, too, that a certain amount of prejudice has intruded itself on both sides. It is likewise interesting to observe that the zeal for demonstrations burns brightest south of the Mason and Dixon line, because it was there that Dr. Knapp carried on his epochal work.

There is enough of the demonstration idea of agricultural education existent and working to furnish in a few years a fair comparison of the two fundamentally opposite theories as they work out in practice. It is to be hoped that nothing may prevent a full trial of the older, more unique, but less tried demonstration method, for all in all extension work probably offers the American farmer more actual relief than any other agency.

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# Harvest

(*From page* 4)

of this age have worshipped finance and mechanics so blamed sedulously that we have pitted the one against the other in a race leading us all up a blind alley.

The old wheeze used to be as follows: "to buy more land to raise more hogs to buy more land, ad infinitum." Now it may be paraphrased to run: "to get more funds to buy more mechanical contrivances to ease up on time and labor to release more funds to try out some new inventions and contraptions." Each new addition to the mechanical wonders of the age requires new laws and regulations, new public set-ups and safeguards, new facilities, and *new revenues*. So our thin check-books get dog-eared with usage in paying for our mechanical mania and settling public expenses thereunto appended.

As a matter of fact, neither you nor I, if we are average mortals, clearly understand one iota of the cause and effect of half the mechanical luxuries we enjoy. We just use them and pay for them, all at once or in driblets. Then we scan the papers looking for more marvels that somebody else has conquered with more brains that we have—but which our children will regard as necessities before we have the mortgage paid.

In the old hot harvest fields they used to take time off with the jug for a rest. In our day we can't stand for a recess from unending invention and unending refinance measures.

The harvest field used to be the center of the universe. The harvest hands were the lords of creation and the scanty crew of professional men catered to them with little competi-

tion and slight compensation. Nature never paid in slow installments, but she dumped the whole horn of plenty in a heap for ox-teams, cradles, dash churns, flails, and sweaty pioneers to wrestle into a meal of victuals. The field and the harvest hands are no longer the crux of the situation. It's the tractor and the combine, the electric motor, pedigreed grains, and soil treatment.

Instead of the question "Who is the mother of the chick, the laying hen or the sitting hen?" let me propose one equally innocuous. "Is it the inventor or the boy who left the farm who is responsible for the *greater* surplus produced by *fewer* farmers?" Is the boy who left the farm earning enough to nibble up his share of the surplus left on Dad's 40 acres, or is somebody somewhere obstructing the flow of food at fair prices and his share of good wages and steady work?

STILL I feel that my best answer lies in the race between finance and mechanics. The same thing would happen in a harvest field where two grain binders began a contest. It would be thrilling while it lasted, but tough on the horses. Finance and mechanics make a great team in a harvest field or in any enterprise, if they don't get to yanking in the tugs.

After all, one real trouble is that our industrial harvest field is so much larger than it was back when the Master Farmer's sire tackled the prairies with his oxen. In some spots we are using great combines in both agriculture and industry, speaking in metaphor. In other places we are using cradles and scythes. The farmers and the factorymen using the best tools can't quite see the finances in the same way that the smaller fellows do. Even President Hoover had to do some tall figuring to get them into the same denominator, and then he found they didn't have the same cube root or something. Every new immigrant landing among us and every new infant out in the hospital adds to the jargon in our wide-spread harvest fields.

We need some kind of industrial Esperanto language to make us understand each other. We need it because we are trying hard to make democracy safe for Americans.

We imagine that because we are supposed to speak one language that the schools teach as official that this gives us the key to a thorough understanding of the playing signals. The trouble is that too many of us talk in "hog Latin." We must learn that prosperity means something besides more money and new thrills. There is something golden in the harvest field besides lucre and something musical out there besides gears and sprockets.

This should not be construed as a diatribe against machines. None of us would turn back the clock. However, this much I do subscribe to heartily until disproven: that the machine age has brought into play selective forces in farming which reject the mentally unfit, and so machines reduce the *quantity* of farm labor and increase the average *quality of* thought put into the job.

Abraham Lincoln once spoke at our state fair and stated that the time was coming fast when educated men must work and workers must be educated. Along with it he predicted the coming of the mechanical age that would make the harvest field a battle ground for perspicacity as well as perspiration. I hope we have arrived.

Returning again to the theme of the farm which has been in crops for 90 years, I would take a different tack along a mellower route and one more familiar and satisfying.

Martin Everett's father secured the title to the land in government patents in fee simple, six of them from the nearest land office after payment of $1.25 an acre. Each patent granted 40 acres to this pioneer as a

reward for leaving the stony and storied East. Two of them were dated 1840 and signed by Martin Van Buren. Four of them were dated 1844 and bore the scrawl of John Tyler. As we scanned the faded parchments, I seemed to hear echoes of old-time campaign songs: "Van, Van, the Used-up Man," and "Tippecanoe and Tyler, too."

Then I glanced up at the aged maple grove and the glittering grain on fertilized meadows. A thought struck me, and I repeat it. Here was probably the *only* type of industry in my state that had the highest testimonials of inherent right and title that could be bestowed by Democracy and Providence. Not a store or a factory that I knew could show such proof of eminent domain. Smiling nature in its harvest splendor for the ninetieth season had rejoiced in its bountiful ability to render this estate a happy and congenial spot in which to live. Tucked away in the bureau drawer along with the wills and family heirlooms were these documents signed by two presidents when the act of 1820 first opened the great western country to the adventurous settlers.

Here, then, we had mute proof of the Permanence of Agriculture. True, there are farms in the valley of the Somme or along Flanders fields which date back nearly 800 years in the same families. But this was a farm in my own state, a somewhat new and crude place, a region of but three generations dating to the backwoods.

ANOTHER evidence of the Permanence rendered by man came to me when the Master Farmer showed his row of account books, kept regularly by lamplight for 40 years. No broker or banker could have made more careful entries than he in noting such items as "bought two rolls of fence wire for $2.25;" or "sold 10 pounds of butter for $3.00." The herd books were marvels of neatness and regularity. The daily milk production of every cow each night and morning was recorded since the year I was born. "I bought a Babcock tester in 1899 and was one of the first men hereabouts to learn what fat my cows were making." Out we went to the tool shed, where he fumbled around and located the battered old Babcock centrifuge, one that worked on the friction system. Painstaking method has brought its reward to him, for his herd of less than 20 cows made more than 450 pounds of butterfat last year.

His philosophy is like unto the dictum of many a man who has stuck to the place he loves, while the rest of the world went mad after financial goals. He chased no ruby rainbows, but quietly followed the seed time and the harvest for three score and ten years, happy in the situation that brought him an opportunity to meet and solve problems akin to the oldest things in the universe.

If I had said to him in the language of the sentimentalists, "Oh, the country life is good because it is the simple one," he would have promptly taken me back to the depot in his useful Ford. But I am far wiser to the land than that.

He and I knew without mentioning it that it is far simpler to pick up a milk bottle on your front porch than it is to milk a herd and nurse the garget and the scours. We knew without referring to it that one can buy a can of peas or corn without studying soil fertility or legume inoculation.

No Master Farmer, or his kith and kin remaining unsung to history, ever sought the farm because it was simple. Maybe on a *poor* farm, but not on a good one. And what is more to the point as I have said before, this present era only adds to the complexity of agriculture and gradually weeds out the unfit and the feeble willed persons —despite telephones, motors, and radios. The essence of the hold that farming has on these generations on the land lies in its perplexing prob-

lems and the challenge it throws at red-blooded Americans.

In some old country agricultural regions generations stick to the land because of sordid chains or slothful inertia. In America the succeeding generations remain because they like to solve puzzles amid pleasant surroundings.

Next to that spirit of Permanence lingering in every nook and cranny of the farm, including the sugar bush that had been operated for 80 years, I found comfort in Good Citizenship and Progressive Content.

THERE are two kinds of ordinary citizens among those who stick to work and keep out of jail. One kind is like the brake on a car and the other resembles the accelerator. One extreme is the ultra-conservative, the other extreme is the radical. Hence I have spoken of this Master Farmer as a good citizen because he embodies "progressive content."

He used a new variety of barbless barley this year, warranted to be reasonably resistant to stripe disease. When the harvest came there was over 10 per cent stripe in the grain. Did he rant at the experiment station or cuss the seed treatment practice as a fraud and a burden on the tax payers? Hardly, for he studied a little and found out that when his son took the barley for seed treatment with formaldehyde at a neighboring farm, the mixture had been used so often that it was too weak.

When his mower broke down in the hay field before a thunder storm, did he shout maledictions at the dealer? No, for he found that his cutter bar was not in perfect alignment and something ailed the pitman. His years of experience have taught him the law of cause and effect, plus the tolerance permissible in cases of human error. The inquiring mind in everyday practice is just as helpful as it is in the laboratory.

His brand of contentment is not the easy-going, lack-lustre kind of existence that accepts anything and everything. His mind is always right up on the firing-line with the rest of the sharpshooters, but he isn't sniping all the time at things he believes might be "regulated." He keeps his powder dry and his castle secure from invaders. I have reason to feel that of such material were the Minute Men of Concord, who would rather farm than fight, but could do a little of both if necessary.

So there he stands in his seventy-second year, possessing indisputable government grants to his homestead, reinforced by the largess of each recurring harvest. He has not lived unto himself alone, for his life has taken into it certain small tasks of a township nature and a few school duties. As an example of sturdy American courage and hope his life has been of some value outside of the measure that mankind is wont to use.

Likewise he is fully aware that the city approaches closer to the fringes of his eminent domain. He sees this in evidences of trespass on his property and regulations as to his milk house and milk delivery. He is beseiged with organizers for this or that cooperative because the market conditions are changing and agriculture must forge chains or be bound with them. To all this he is not indifferent, but he resembles an old owl in the rigid, unblinking manner in which these facts fail to shake him from his perch.

Who knows? Possibly in a score of years in the future scroll we should not have selected him or his kind for the title of Master Farmer. The safety razor is not the only thing that is altering the countenance of agriculture. But in all times and in most places under the sun the philosophy of optimism and courage will serve to stabilize farming more than anything drastic will do, simply because it works best and stays longest in the hearts of those who have inherited it from the soil.

### BUDDING NATURALIST

Little Albert came home from school with a new book under his arm. "It's a prize, mother," he said. "A prize? What for, dear?" "For natural history. Teacher asked me how many legs an ostrich had and I said three." "But an ostrich has two legs." "I know that now, mother, but the rest of the class said four; so I was nearest."—*Boston Transcript.*

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"Since I bought a car I don't have to walk to the bank to make my deposits."

"Ah, you ride there?"

"No, I don't make any."

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### ORDERLY PROCEDURE

John had become the proud owner of a pig, and insisted on caring for it himself.

After a few weeks, his father noticed that the animal did not appear to thrive, and remarked:—

"John, you are not feeding your pig enough. It doesn't seem to be fattening at all."

"I don't want to fatten him yet," answered John. "I'm waiting until he gets as long as I want him, then I'll begin to widen him out."

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### AS WE WERE SAYING

A local newspaper recently said that scientists have invented an earthquake detector that goes off like an alarm clock. What most of us need is an alarm clock that goes off like an earthquake!—*Lehigh Burr.*

### EMOTION

A man was discovered by his wife one night standing over his baby's crib. Silently she watched him. As he stood looking at the sleeping infant, she saw in his face a mixture of emotions—rapture, doubt, admiration, despair, ecstasy, incredulity. Touched and wondering alike at this unusual parental attitude and the conflicting emotions, the wife with eyes glistening arose and slipped her arms around him.

"A penny for your thoughts," she said, in a voice tremulous. He blurted them out:

"For the life of me, I can't see how anybody can make a crib like that for three forty-nine!"—*The Pitchfork.*

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A college professor and his wife were entertained at dinner a few weeks ago. In the midst of the gayety at the table a child's voice was heard coming from the floor above.

"Mother!"

"What is it, Archie?" she asked.

"There's only clean towels in the bathroom. Shall I start one?"—*Fyr-Fyter.*

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A pastor, fond of figures of speech, was making a funeral oration.

"Friends," he began in a lachrymose voice, "we have here before us only the shell of the dear departed. The nut is gone."—*Chicago Tribune.*

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*Modesty, like a blue serge suit, is always becoming.*

# *The* A-B-C's *of* Potash

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